Cincinnati beckons! Bigger and better are the watchwords for the 17th Annual Convention of Practical Coal-Operating Men and National Exposition of Coal-Mining Equipment, opening at the Music Hall, Cincinnati, May 3. See Harry M. Moses' invitation on p. 59 and the program on p. 74. And don't miss it . . . Cincinnati attendants naturally will include the Coal Age editors to gather material for concise summaries of the technical sessions and exhibits. Look for these in the June Report Number . . . **Lower costs** is the showtime and all-time theme in coal mining. So Coal Age this month includes a supplement devoted to "130 Cues to Coal-Mining Profits" — a list of questions designed to point the way to economical production. Salient facts on mining progress also are presented graphically for quick comparisons . . . **Keeping abreast** of developments in the industry is a point of pride with the Coal Age staff. Therefore, it takes particular pleasure in presenting on p. 67 the first study of a new hydraulic coal-breaking unit which, for the past ten

(CONTINUED ON PAGE 7)

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Contents

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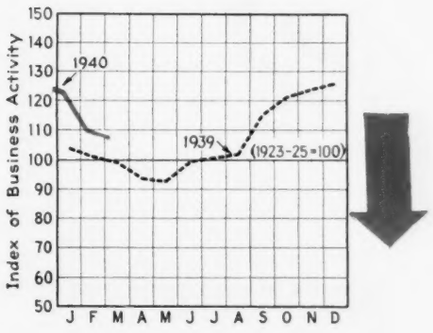
(CONTINUED FROM PAGE 5)

months, has been keeping two loading machines in coal at New Monarch mine . . . **Executives and sales heads,** in addition to preparation men, also will find much meat in how Isabella mine successfully reclaims coal from mine slate (p. 71)—another "first"—as well as the opportunities for better merchandising revealed in the account of a survey of domestic users on p. 78 . . . **Safety,** too, figures in this issue, along with mechanical mining and conveyor controls, with a story on how a major anthracite company promotes organization of its key men to reduce injuries (p. 60) . . . **Looking to the future,** Coal Age has in its bag for early publication articles on: mines in western Canada; hoist-operated "pit-car loaders" at Cranberry No. 1 mine, southern West Virginia; mobile loaders and automatic couplers at Crescent No. 2 mine, western Pennsylvania; shooting revisions to reduce powder cost and raise lump yield at the Talleydale mine, Indiana; reopening and modernization of the Blocton No. 9 mine, Alabama, and various other phases of mining, merchandising and utilization the country over . . . **The Coal Age front cover** this month, showing Harry M. Moses, national chairman of the program committee, American Mining Congress, was released for editorial use by the Timken Roller Bearing Co., whose advertisement occupied this spot last April.

HOW'S BUSINESS

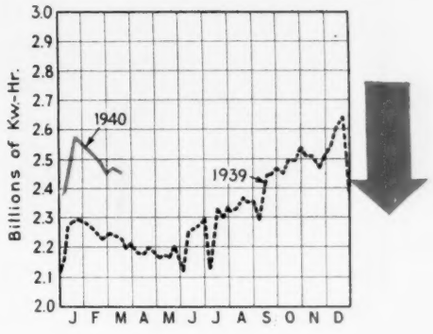
GENERAL BUSINESS ACTIVITIES

The recession has reached a critical juncture, according to *Business Week*, its index having reached 107.9 during the week ended March 9. There are no conclusive signs that the decline in industrial activity will not be arrested at the estimated resistance level of 105. Nor are there tangible indications that the Index will start to move up once it gets down around 105; there may be periods of stalemate, with an upturn awaiting an accumulation of orders—possibly war orders.



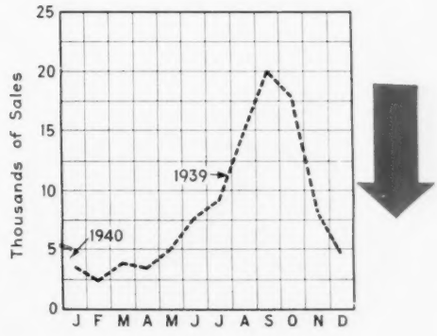
ELECTRICAL POWER OUTPUT

Output of energy by the electric light and power industry during the last month has moved closely parallel with the trend a year ago, but on a level about 10 per cent higher. Figures by the Edison Electric Institute for recent weeks are: week ended Feb. 17, 2,476,000,000 kw.-hr.; Feb. 24, 2,455,000,000; March 2, 2,479,000,000; March 9, 2,463,999,000 kw.-hr. The largest gains for 1939 are reported in the Rocky Mountain and Central industrial States, the smallest in New England and on the Pacific Coast.



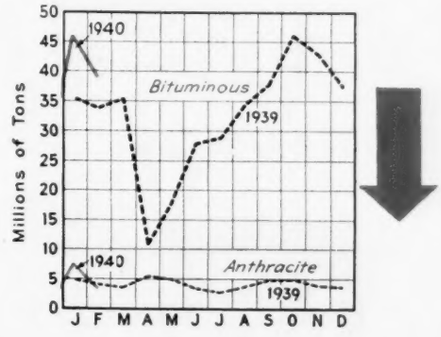
COAL-STOKER SALES

Mechanical stoker sales in the United States in January last totaled 4,059 units (U. S. Bureau of the Census from 103 manufacturers), compared with 4,969 in the preceding month and 3,604 in January, 1939. Sales of small units in January last were: Class 1 (under 61 lb. of coal per hour), 3,375 (bituminous, 2,872; anthracite, 503); Class 2 (61-100 lb. per hour), 366 (bituminous, 348; anthracite, 18); Class 3 (101-300 lb. per hour), 190.



COAL PRODUCTION

Bituminous-coal production by United States mines in February last (preliminary figures) totaled 39,270,000 net tons, according to the Bituminous Coal Division, U. S. Department of the Interior. This compares with output of 44,940,000 tons in the preceding month and 34,134,000 tons in February, 1939. Anthracite tonnage in February last was 3,544,000 (preliminary), according to the U. S. Bureau of Mines, against 5,622,000 tons in the preceding month and 4,114,000 tons in February, 1939.



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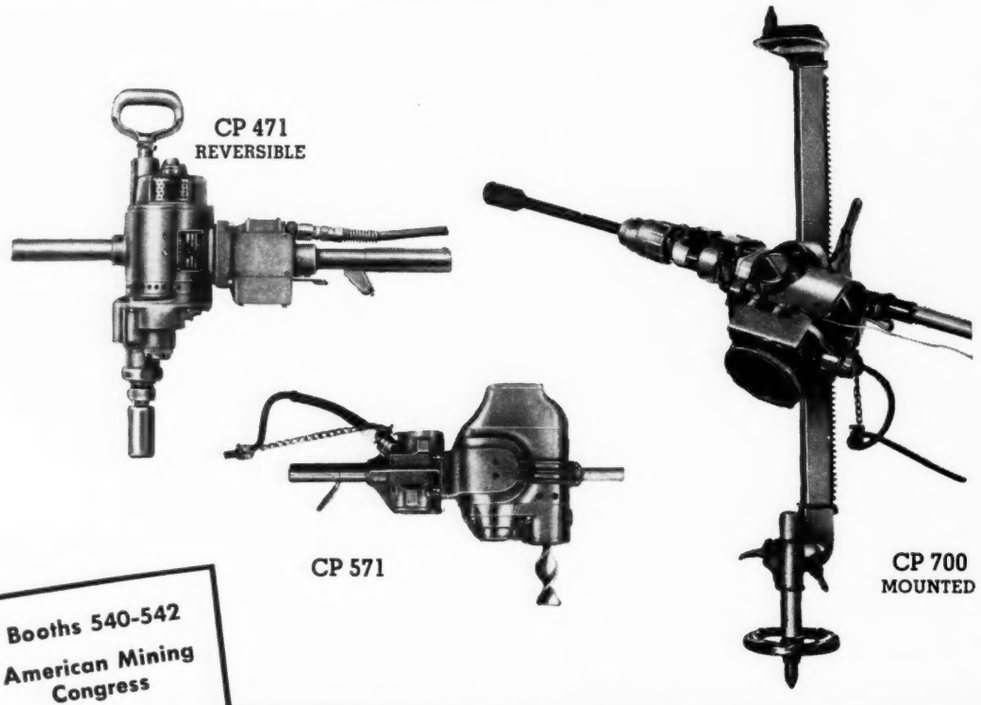

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Coal Age

Established 1911 — McGraw-Hill Publishing Co., Inc.

SYDNEY A. HALE, Editor • APRIL 1940

Pertinent and Impertinent

• TOO MANY wasted dollars wrongly charged to advertising are actually unprofitable tributes to the vanity of business men hungry for empty appreciation and the plaudits of their fellow citizens. Advertising is a sales tool and should be used as such. The consuming public—as distinguished from the investing public—is not interested in buying a share in an industry but can be sold the idea of buying that industry's products. Does industry want compliments or orders?

• NEXT TIME some crepe hanger insists that 1940 is bound to be bad for business because it is a Presidential election year, quietly ask him if he knows what the actual record is. As our associate, *Business Week*, recently pointed out, since 1792, business, based on the Ayres Index of Industrial Activity, rated normal or better in twenty-one such election years and was subnormal in fifteen—largely because business cycles observe no four-year rule.

• INCREASED OUTPUT per shift means decreased costs per day in any man's language, but how to get it is more than a matter of wishful thinking. Coordination of man power and machinery will do the trick under any given set of operating conditions; time-study yardsticks, however, must first be established and time losses eliminated before results will be apparent. A tick of the clock either indicates additional production or lack of it. When each minute is translated into dollar cost per crew, per shift and per mine, the pyramiding values of irrevocably lost operating time become appallingly measurable.

• WHAT the outcome of the proposed Barkley-Mansfield stream-pollution legislation will be now awaits the action of House and Senate conferees. But the Mundt amendment that hereafter no one shall be allowed to discharge polluting material from new sources into navigable waters or their tributaries except with the approval of the Federal Government might easily stop the construction of new coal mines and many other industrial plants. Even alkaline water may be condemned if it has more salts than were in the water entering the mine. Is this the way the Congress of the United States wants to promote greater prosperity for the nation?

• "HOW CAN I reduce costs and increase profit margins?" is a question which can never become static in a competitive economy. And the answer usually begins with a searching self-examination. Not always easy either when, as in coal mining, the problem has so many aspects and ramifications. In the hope of making the job a little easier by suggesting a number of starting points for an analytical review, *Coal Age* in this issue presents a quiz supplement entitled "130 Cues to Coal-Mining Profits." The editors, of course, cherish no idea that these questions are all-inclusive or exhaust the possibilities of the subject. But they should stimulate independent thinking and

managerial soul searching. And also a model blueprint of things to see and discuss when you go to the Cincinnati convention this month-end.

On to Cincinnati

MODERNIZING production and preparation programs are conceived, plans are crystallized and their initial impetus given each year at the Coal Convention and Exposition of the American Mining Congress in Cincinnati. The 1940 show, April 29-May 3, comes just at the time when industry's personnel needs a "breather" from the trials and tribulations of a strenuous operating season and a chance to exchange ideas with fellow operators and to examine new types of mining equipment and supplies designed for more efficient and lower-cost tonnage. As usual, technical sessions and entertainment are scheduled for a happy combination of business and pleasure. Come on to Cincinnati! We expect to meet you there!

Federal Inspection

PUBLIC RELEASE of the Bureau of Mines' report on the Bartley explosion casts some significant sidelights on the manufactured clamor for enactment of the Neely federal mine-inspection bill. Certainly after this release, proponents of new legislation can no longer maintain that such legislation is necessary to give Washington authority to make public accident-investigation findings. That authority already has been claimed and exercised in this case. Neither is there anything in the report itself to support the implication that the proposed legislation would prevent the recurrence of such tragedies.

Just how or where the explosion occurred is left to speculation by the report. But two of the possible causes of the blast—live-cable splicing and smoking in the mine—were direct violations of the company's safety regulations. Presumably such violations did not take place in the presence of supervisory employees. It is difficult to see, therefore, how any federal-inspection system would have been or could be any more successful than State and company inspections in forestalling such violations. Simple imposition of an impotent federal system on existing local supervision can work no miracles of reform.

Despite its obvious limitations, the Bureau report does embody a number of recommendations which are indicative of how helpful such investigations impartially conducted and reported might be. Since there is no guaranty, however, that the legal opinion upon which present publication is based may not be reversed by some future departmental solicitor or other administrative law officer, the necessity for statutory clarification and specific amendment of the act creating the Bureau still remains. Enactment of such an amendment would be a constructive step in promoting greater safety in mining; the Neely bill is not.

Death on the Road

THOUGH the fatalities from haulage accidents in bituminous mines fell from the high mark of 446 in 1918 to 152 in 1938, the number should be lowered still further. In 1936, the British fatality rate for this class of accident was 0.857 per million man-days of all men employed at the mines exclusive of salaried men and clerks; our bituminous rate was 2.106 per million, or 2.456 times as great, based on the payroll list of active companies. Seeing how costly are wrecks in compensation and replacement of equipment, economy supports emotion as a reason for greater safety in haulage.

Apologists may say that the animal-and-rope haulage of British mines is not as dangerous as the systems used here because it is slower and does not involve such large cars or long trips. This, however, is not a convincing statement. The railroad car of today is larger, travels faster and in more numerous company than at the beginning of the century, but by forehandedness, good rules and safety propaganda, hazards have not increased with the size of the unit. There is no reason why larger equipment in coal mines should add to the dangers of haulage.

Broader Education

EXECUTIVES who have taken the lead in enlarging opportunities for technically trained men in coal mining are beginning to question standard engineering-school curricula. They are demanding greater breadth as well as specialization in the training of the industrial recruits turned out by the colleges. There is no complaint that the graduates are not qualified from the purely technical standpoint; indeed, it is hinted that possibly too much time has been spent in teaching slide-rule dexterity and mathematical formulas and too little, perhaps, in fitting the student to deal with his fellow men.

The underlying challenge is not new in educational circles. It has its roots in the old conflict between the classical school which grew up when education was primarily cultural and the modernists who insisted that the student should be taught something which had an immediate cash value in the industrial marts. Today far-sighted management which must cope with the growing complexities of industrial civilization is coming more and more to realize that successful handling of the machine depends upon successful handling of men.

This calls for something more than highly trained technicians. Engineering knowledge must be buttressed with a sympathetic understanding of human relations and the origins and trends of the social-economic forces that are shaping modern industrial destinies. Not a few believe that the answer in so far as preliminary training is a part lies in a sane combination of specialized and general education with emphasis in the latter on human and economic problems. How this combination should be effected is a problem which can be worked out only through the cooperation of both industrialists and educators.

LOADERS AND SHUTTLE CARS

Handle Coal at Jefferson No. 20

Where Mechanization Facilitated Reopening

Deepest operating mine in Illinois, Jefferson No. 20 (formerly Nason) has been mechanized with loading machines and shuttle cars following its reopening in 1938. With coal 5½ to 8½ ft. thick under 740 ft. of cover, thick pillars are left on the advance and split on the retreat. The seam is broken down with CO_2.

By IVAN A. GIVEN
Associate Editor, Coal Age

ANOTHER in the growing list of old operations whose reopening has been made possible by mechanization of loading is the Jefferson No. 20 mine of the Consolidated Coal Co., Nason, Jefferson County, Ill. Originally developed by the Hebenstreit interests in 1921 for production through two hoisting shafts to compete with other large-tonnage properties in southern Illinois, Jefferson No. 20, then Nason, ceased operations in 1926, was reopened until 1927 and last worked in 1932. Consolidated acquired the property April 1, 1938, reopened the main shaft and bottom, built a new screening and crushing plant, making it possible to reduce all the output to minus ⅝ in. and dedust at 10-mesh, and installed loading machines and shuttle cars underground. Production ultimately will be 400 tons per hour.

Jefferson No. 20 has the distinction of being, with a 740-ft. shaft, the deepest operating mine in Illinois. Reconditioning started in June, 1938, and also included repairs to the power plant, designed and installed by C. M. Garland and equipped with chain-grate stokers; installation of an additional 1,500-kw. turbo-generator to take care of the added mechanical-mining power requirements; a new ventilating fan and emergency man-hoist at what is now the airshaft; and construction of a plant for truck sales.

The Illinois No. 6 seam, 5½ to 8½ ft. thick, is recovered at Jefferson No. 20. It is overlaid by a weak gray shale up to 70 ft. thick. Consequently, top coal is left for protection. Underneath the seam is a hard fireclay. Because of the heavy cover, fairly thick pillars are left as the rooms advance and are split on the retreat.

In the years following 1932, water had filled up 60 or 70 ft. in the shaft, so the first operation was bailing until a pump could be set. On one side of the main shaft the top had fallen solid against the timbers. The other side was open for a short distance. Actual shaft reconditioning largely was confined to resetting the timbers, which required renewal of the last 20 ft. Over the bottom and in practically all other old openings, the roof had fallen as much as 40 ft. To date, part of the bottom has been reopened and timbered to permit production, and eventually sufficient cleaning up and, where necessary, driving of new openings will be done to make possible handling some 125 mine cars per hour. The old main entries and room panels were unusable, so new mains are being driven.

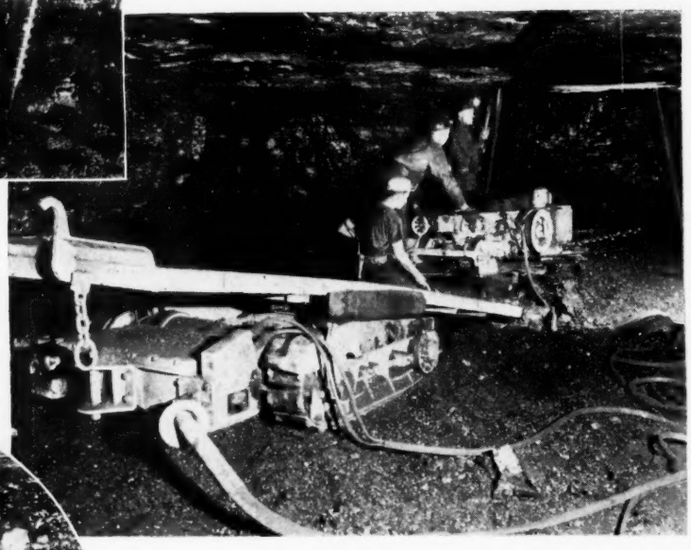
In sinking the shafts a layer of quicksand making considerable water was penetrated about 70 to 75 ft. down. To prevent this water dripping down the shaft it is planned to install a 200-gal. steel tank in the stairway compartment, along with a 200-ft. head 100-g.p.m. Allis-Chalmers centrifugal pump (float-switch control) to put the water to the surface when desired. In addition, the tank will connect to a pipe-line system for sprinkling underground.

The workings make little water, handled by a 75-hp. 800-ft. head 150-g.p.m. Allis-Chalmers pump at the shaft bottom. This pump replaced an old triplex unit, now a standby. Grit and sludge has been troublesome and, to permit it to settle and also provide storage against pump breakdowns and other emergencies, an old section near the shaft is being opened and dammed as a sump. When this is completed, it is planned to pump only once a week.

Cars are hoisted by a Litchfield 7- to 11-ft. stepped-drum unit driven by 28x48-in. engines. Hoist capacity (1½-in. ropes) is 3 cars a minute over a total distance of 800 ft. Steam for hoist operation, for power generation and for other plant uses is supplied by three 460-hp. Springfield boilers (200 lb. working pressure, 200 deg. of superheat) equipped with Harrington chain-grate stokers fired with slack, crushed bony pickings and 10-mesh dust. Power-plant reconditioning included relining the stack, repairing the superheaters, installing new boiler feed lines and grate links, etc. To supplement the original 500-kw. high-pressure and 1,000-kw. mixed-pressure Ridgway turbo-generators, a 1,500-kw. high-pressure Allis-Chalmers machine has been installed. Room also is available for an additional boiler unit. The boiler plant also will supply steam for the emergency man hoist at the airshaft, where a 7-ft. Aerovane fan was installed, leaving the original steam-driven centrifugal unit as a standby.

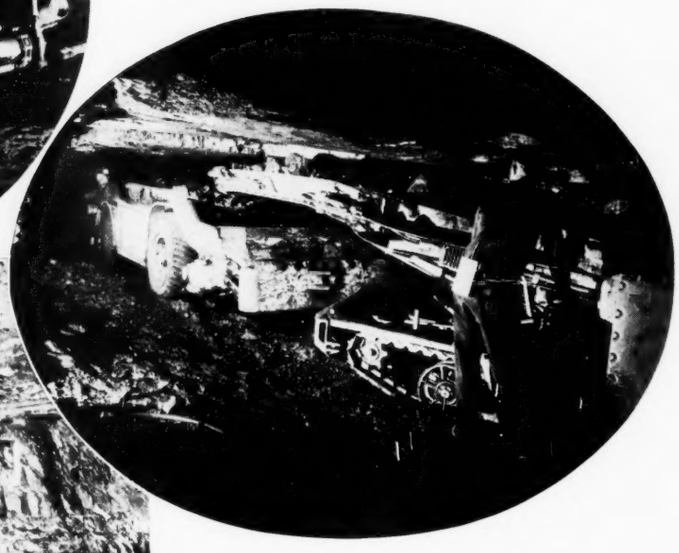
Production units at Jefferson No.

Drilling for a 2½-in.-diameter carbon-dioxide shell at Jefferson No. 20



Pulling in to the loading station up a grade and around a curve.

New type shortwall sumping in for an undercut in a room face. In the foreground is the caterpillar-mounted transfer truck.



Shuttle-car getting a 6½-ton load in a 12-ft.-wide heading.

Loading a room face with carbon-dioxide shells.

20, where H. A. Maconaghie is superintendent, George W. Cravens is mine manager, Frank Moulin is night foreman and David Neal is chief electrician—also handling preparation and other top activities—are made up of the following: one Joy 7-BU low-pedestal loading machine, two 6½-ton Joy shuttle cars with Exide-Ironclad 300-amp.-hr. 48TLM batteries on the sides, one Joy elevating, or car-loading, conveyor, one Chicago Pneumatic post-mounted coal drill with Cardox conveyor-type augers and one Goodman 512 universal shortwall cutter with 9-ft. bar. Cutters are equipped with chains accommodating the Goodman throw-away bit and are moved around on Joy caterpillar-mounted shortwall trucks.

Basic crew members for a unit comprise a loading-machine operator and helper, two cutters, one dust handler and clean-up man, who assists the cutters; two drillers, who also bug-dust; one shotfirer and examiner, and two shuttle-car drivers. One "blocker" spots cars under the elevating conveyor and sometimes can take care of coal from two loading units. Timbermen are worked as required, while a general crew services and lubricates the equipment. The coal is broken down with 231-130 Cardox shells, normally charged with about 6 lb. of carbon dioxide.

Under the Jefferson No. 20 working plan, a shuttle-car "run" usually consists of a minimum of four 12-ft.-wide main headings, plus crosscuts; five panel headings, plus crosscut; or seven rooms, one the key opening from which haulage branches off to the side rooms. Working territories are opened by the mains (four headings on 60-ft. centers), from which panel entries (five 12-ft. headings on 70-ft. centers) are turned 90 deg., as in Fig. 1. From the panel entries, rooms 22 ft. wide on 70-ft. centers are turned both ways. Rooms are necked about 14 ft. wide and when they are driven up 500 ft. the 48-ft. pillars are split on the retreat.

Shuttle-car loading points normally are placed 500 ft. or less apart. In advancing a main, one is placed at the mouth of a panel entry, which means, with 500 ft. rooms and a 25-ft. pillar between panels, that the distance to the next panel-mouth loading station is 1,305 ft. Therefore two intermediate stations are installed or the haulage distance may be stretched and only one placed. In starting a panel, the general practice is to drive the main ahead to the next station and then, while the track is being laid up (Fig. 1), start developing the panel entry. Before the main's unit quits a panel entry, it is supposed to drive the latter far enough to install the two outby stations and the necessary tracks, as well as the diagonal up to No. 7 room on the left. This permits throwing a production unit into a full group of seven rooms on both sides of a panel entry, with another, if desired, to advance the headings. Or the rooms may be worked advancing on one side and retreating on the other. Or the entry may be driven up and the rooms worked out, etc. In other words, with double loading points and five headings comprising a working territory in themselves, maximum flexibility is assured not only in production but also in ventilation and the like.

Even though not for immediate use, loading stations are built as the advance comes to them. Pairs of 90-lb.-rail crossbars are set on each side of the loading point and then about 2 ft. of roof is shot down. Additional bars are set on either side as necessary to guard against falls. The head of the elevating conveyor goes up into the shot-out space, while the boot is placed in a hole shot deep enough to sink the top level with the fireclay. Top and bottom shooting results in about 3½ cars of rock, picked up by a loading machine. With places already prepared, taking down an elevating conveyor, pulling it to the new place with a loader and setting it up takes only 2 to 3 hours. As shown in Fig. 1, loading stations are placed in the next heading over from the haulage heading, with track through the crosscuts both in front and behind. Thus, trips may be pushed in behind to drop out or in front to drop in past the elevating conveyor, depending on the grade.

All crosscuts (see Fig. 1) are driven on a 60-deg. angle and are arranged, with the few necessary exceptions, to

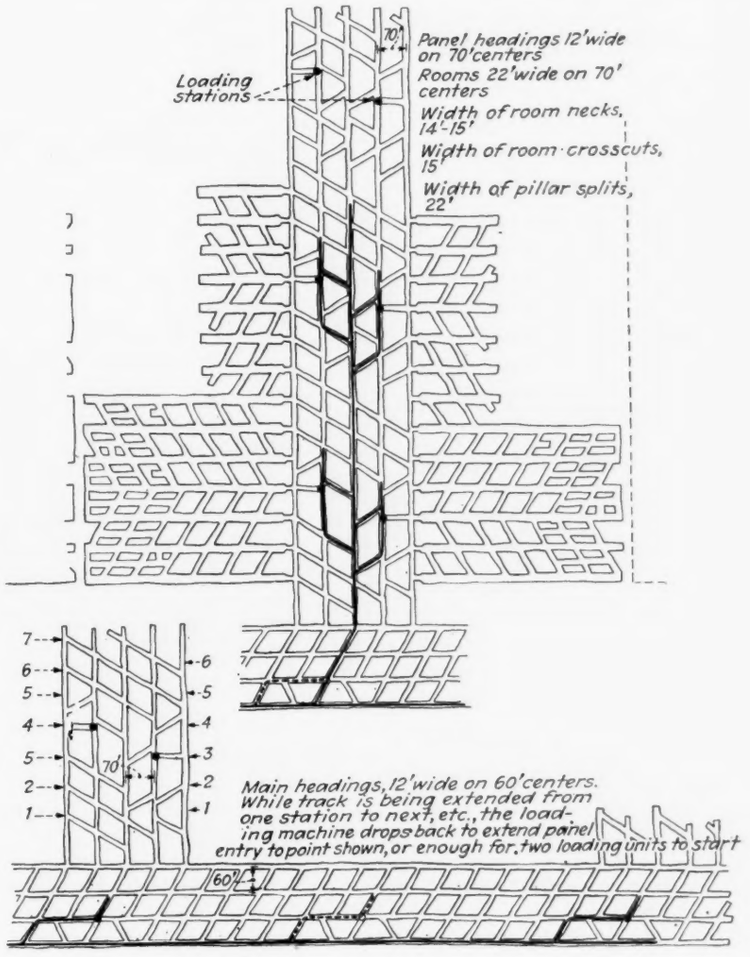


Fig. 1—Diagrammatic sketch of a working panel, Jefferson No. 20 mine, showing method of working rooms and splitting pillars on the advance on both sides of the entry. Other schemes for mining a panel are discussed in the accompanying text. The sketch also shows normal loading-station and track locations.

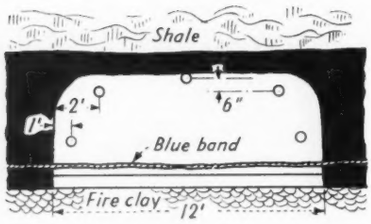


Fig. 2—Drilling plan for 12-ft.-wide headings, carbon-dioxide coal breaking.

direct the shuttle cars by the nearest route to the loading point. In a seven-room working territory, therefore, traffic is directed to the "key," or No. 3 or 4, room, which leads straight to the loading-point crosscut. Thus, using No. 3 room, maximum one-way haul to the face of the farthest 500-ft.-deep rooms is around 1,000 ft., with the average about 600. The haul in headings is about the same. In these, LaDel-Troller and Aerodyne "Midget" blowers are used between crosscuts (70-ft. centers), and have sufficient power to put the necessary air to the face without tubing. Consequently, none is used.

The final pillar-splitting step in room work consists simply of driving an opening 22 ft. wide through the pillar, about 55 ft. long, from one end. Or if conditions prohibit entering from one end, an opening is driven in from the side and branched both ways to complete the split.

Except that tracklaying is eliminated, the Jefferson No. 20 face cycle comprises the usual timbering, cutting, drilling, bug-dusting, breaking down the coal, and loading. Cleaning up usually is done by the dust loader, with assistance from the cutters or drillers, if required. Normal timbering consists of a row of props on one side of the place, leaving a 14- to 15-ft.-wide shuttle-car runway. Where conditions warrant, extra props or cross-bars are used, although low coal in places prohibits barring without cutting into the top coal.

In 12-ft. headings, a face cut 12 ft. wide and 8 to 8½ ft. deep usually is broken down with five holes, but with four occasionally. In 22-ft. rooms, five holes is standard. The No. 6 seam at Jefferson No. 20 carries the characteristic "blue band," 1 to 1½ in. thick and 6 to 24 in. above the bottom. Consequently, bottom holes are drilled to break down and roll out the lower part of the seam, including the band. This facilitates bringing down the upper part.

In headings, the two bottom holes are drilled 2 to 2½ ft. above the bottom and about 1 ft. in from each rib. Cardox, in 2½-in.-diameter shells, is used, as noted, to break down the coal. Top holes originally were drilled straight in at, where possible, the natural top-coal separation line. But the tendency of the carbon-dioxide gas to go up into and peel down the top coal resulted in dropping the two rib holes some 6 in. below the center (Fig. 2), giving a pronounced arch effect, particularly in headings, and eliminating much of the peeling. Emphasis is placed on sumping square and drilling top holes straight in instead of gripping, also materially lessening the tendency of the gas to work up. The room-drilling plan (Fig. 3) is substantially similar.

Two shuttle cars normally serve a loading machine. To date, grades of as much as 10 or 11 per cent have been encountered, on which the cars have done comparatively well despite having to slow down. Composite mine cars holding about 3½ tons, or slightly over half a shuttle-car load, are scheduled for Jefferson No. 20. Trips are dropped past the elevating conveyor one by one under the influence of gravity. When a trip is loaded, a haulage locomotive exchanges it for a new one.

Power is taken into the mine at 2,300 volts via cables down the hoisting shaft. These connect into a distribution system of Okonite and U. S. Rubber submarine cables. From the bottom to the main inside junction, wire size is 2/0, followed by No. 2 wires to the various working territories, and No. 6 circuits to battery-charging stations (2,300 volts a.c. to 125 volts d.c.). All a.c. cables are buried in trenches.

In d.c. distribution (275 volts maximum), haulage and face work are strictly separate. In other words, a 300-kw. Westinghouse motor-generator set with full-automatic controls supplies the haulage system, 6/0 trolley wire, Ohio Brass hangers, with an auxiliary 100-kw. Ridgway set for idle-day service. Production equipment, but not shuttle-car charging stations, it is planned, will be served by 150-kw. Westinghouse sets (automatic on the d.c. side), one in each working territory.

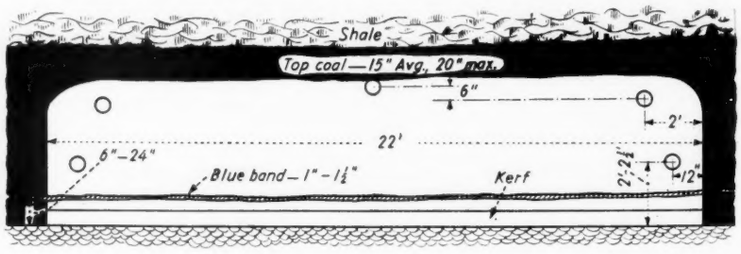


Fig. 3—Drilling plan for a 22-ft.-wide room

Loading station and elevating conveyor at Jefferson No. 20. Note at the right how a pair of rails are put up to define one side of the hole to be shot out in the roof.

WHAT CINCINNATI MEANS TO COAL

An Invitation

From the National Chairman

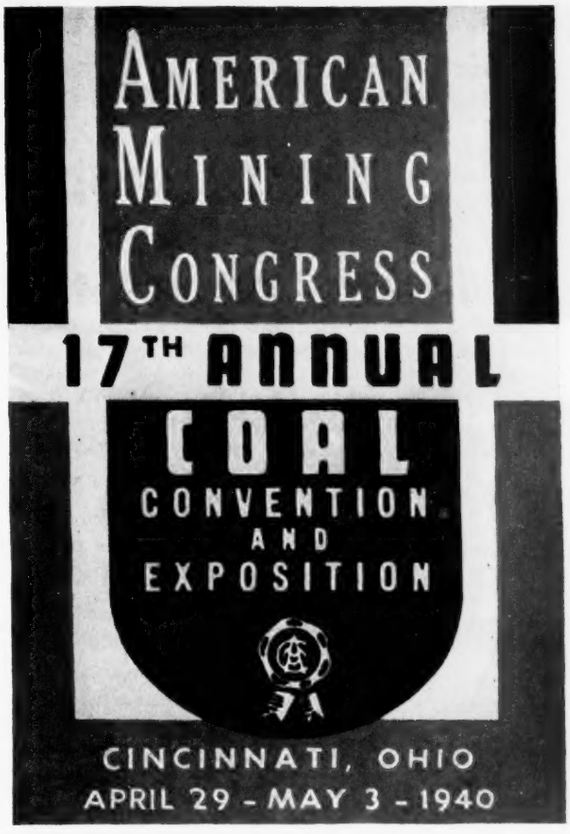
▼

FOR 16 years the annual Coal Conventions and Expositions of the American Mining Congress have "sparked" progress in the art of mining coal, with the result that modernization of equipment and methods is forging resolutely ahead and coal is maintaining its position as the nation's leading energy source. The momentum of this progress is all-important and can best be maintained through the industry's concerted support of these annual meetings.

The 17th Annual Coal Convention and Exposition will be held at Cincinnati the week of April 29, and again will bring together thousands of mining men and manufacturers for their yearly review of the modern way in coal mining. Past experience has proved the tremendous influence which these gatherings exert toward improved operating conditions and practices and their effect on the general welfare of the coal industry.

Each year, a nationwide committee of practical operating men selects a convention program covering coal's most pressing problems. The convention discussions bring out the best thought of the industry on methods and equipment for each particular phase of operation by showing how our most progressive mines are turning coal out safely and efficiently. Coupled with the formal program discussions is the informal exchange, or "swapping," of ideas.

Every year, also, the nation's leading manufacturers of mining machinery, equipment and supplies exhibit their products and services, with special emphasis on new developments and new adaptations of proved products. The far-reaching value of such an array of exhibits can hardly be overestimated. Through this medium, coal men are privileged each year to learn at first hand just what is available for every operation in producing coal fuel.



Convention week each year renders still another valuable service in bringing together the coal-mining men of the nation. Their acquaintance and intimate association make for the close-knit industry personnel which is all essential in the cooperative efforts required in meeting harassing economic and operating difficulties.

The 1940 Coal Convention and Exposition promises to take its rightful place in the ascending order of these vital industry events. With the uncertainties facing the industry and the ever pressing question of successfully meeting the competition of other fuels, every operating man in the country should attend this meeting to devote serious study to means for the betterment of the industry. I sincerely hope that every coal executive will attend, together with as many of his operating officials and key men as possible. Come out and give us the benefit of your help in setting the coal industry further along the road of modernization.

Harry M. Moses

National Chairman, Program Committee
American Mining Congress

SAFETY ACCEPTANCE

Approached From New Angle

By Means of Safety Key Men's Organization

Selling safety to foremen is recognized as the most important single factor in success in accident prevention. The Hudson Coal Co. now approaches the problem through the Safety Key Men's Organization—an organization of foremen who qualify because of good records and who take an active part in the development of safety rules and standards and the promotion of safe working habits.

By CARL A. PETERSON
Safety Inspector, Hudson Coal Co.
Scranton, Pa.

A NEW approach to the problem of accident prevention was inaugurated by the Hudson Coal Co. in November, 1938. This effort is based on the formation of a group of officials known as the "Safety Key Men's Organization," briefly described by Daniel Harrington in the March, 1939, issue of the *Mining Safety Newsletter*. This article will outline the organization, operation and objectives of the new plan.

The continuing trend from solid mining to pillar and caved-ground work has tended to increase injury hazards in recent years, highlighting the need for a better method of combating them. We have hopes that effective help will be provided by our Safety Key Men's Organization, as it is universally recognized that the most important single factor in safety success is selling the idea to the foremen in immediate charge of the workmen. The Hudson Coal Co.'s safety efforts always have been directed to that end, but we feel that the past never has produced a device to do it as simply, effectively and directly as our Safety Key Men's Organization.

The company in the past has made various awards to foremen for noteworthy injury-prevention records. These are to be continued in conjunction with the award of membership in the Safety Key Men's Organization. Past awards have consisted of engraved certificates to sectional foremen who go 3, 6, 9 and 12 months without a lost-time injury; pocket knives and lapel buttons to sectional foremen finishing a calendar year without a lost-time injury; presentation of the company safety flag to the mine with the best quarterly record; and an all-expense trip to the National Safety Council convention each year to the colliery superintendent, mine foreman and sectional foremen with the best injury records.

Attempts have been made in the past to organize foremen's safety organizations — membership generally being open to all who were interested. It is in this respect that our Safety Key Men's Organization shows a fundamental difference. Membership in the new organization is restricted to foremen with outstanding safety records and consequently is more worth striving for. In recognizing performance by officials it is a truism of good management that "results count—excuses won't pay bills." Our method of selecting members for the Key Men's Organization is merely the application of this recognized principle to injury-prevention.

Requirements for membership in the Safety Key Men's Organization are that sectional foremen and other foremen in direct charge of workmen must have supervised at least one full year of work and a minimum number of man-hours without a lost-time injury. Man-hour minimums are: sectional foremen, 50,000; maintenance foremen, 60,000; driver bosses, 75,000; outside foremen, 100,000. Mine foremen must have won the company safety flag for the best quarterly injury record at least once.

Selection on such a basis, as might be expected, brought together an extraordinary group of men that everyone at once recognized deserved the honor. As they were not only genuinely interested in safety work but also were well versed in getting tangible results they found the interchange of ideas among themselves both stimulating and interesting. The result was an organization of such excellent human material that it sold itself to both members and non-members from the start. The group was formally organized in November, 1938, at a banquet at the Scranton Club in honor of the men qualifying for membership. The principal speaker was Mr. Harrington, chief of the health and safety branch of the U. S. Bureau of Mines.

A dual function was visualized for the Safety Key Men's Organization from the start. First, it was to be a means of conferring merited honor and recognition upon foremen for outstanding achievements in injury prevention. Second, the organization was designed to take an active and continuous part in the company's safety program. Inasmuch as membership was to signify substantial progress in preventing injuries, it was felt that the insignia should be commensurate with the achievement it represented. Therefore, it was decided to present each member with an attractive gold

key to be worn as a watch charm. Each member also received a membership card to be framed and hung in his office.

Of a total of 173 foremen, 43 qualified for membership at the time of organization. To make it possible for them to take an active part in the company's safety program they were divided into committees of three to five men. Naturally, each man was assigned to the committee where his record and experience indicated that he could do the most good. These committees are as follows:

1. Roof Falls (Inside).
2. Transportation (Inside).
3. Handling Material (Inside).
4. Tools and Machinery (Inside).
5. Gas and Miscellaneous (Inside).
6. Explosives and Electricity (Inside).
7. Slipped and Fell (Inside).
8. Transportation, Handling Supplies and Material, Miscellaneous (Outside).
9. Tools and Machinery, Handling and Preparation, Slipped and Fell, Electricity (Outside).
10. Publicity.

The Publicity Committee edits *The Safety Commentator*, the company's monthly publication devoted to safety matters, and also awards a $5 prize each month for the best safety suggestion submitted by any employee in the previous month. The other committees have the following functions:

1. Study of all accidents in its particular class which occurred on company property during the past year and preparation of bulletins on prevention based on that study.

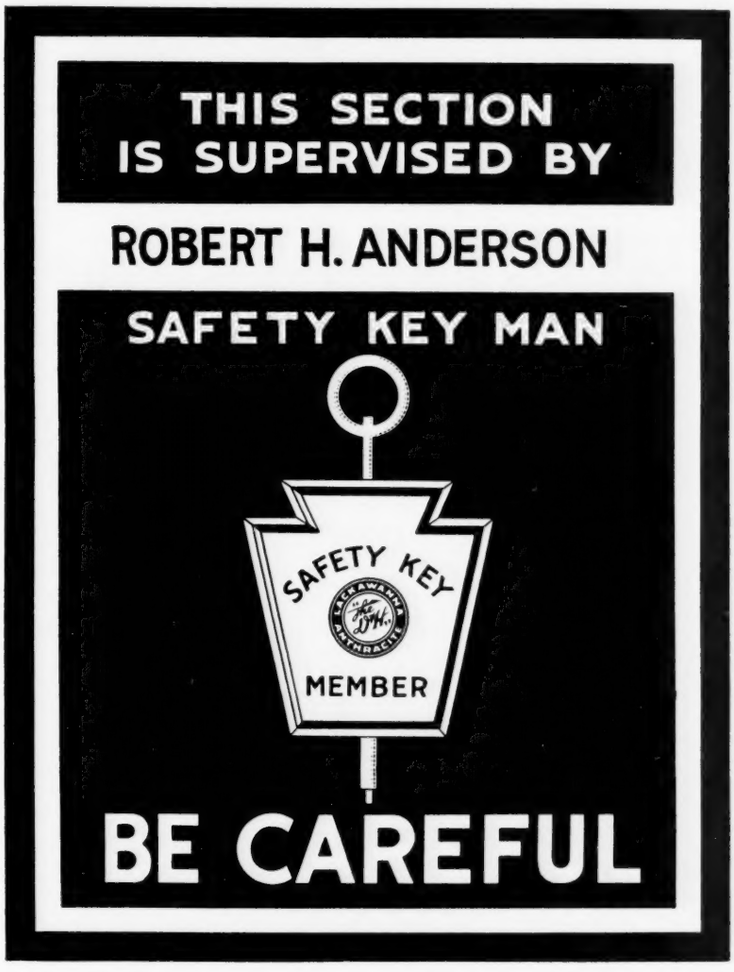
2. Investigation, as a committee, of fatal accidents in its class occurring on company property and submission of reports to the management.

When a committee is studying the previous year's accident record in preparation for the issuance of a bulletin it meets every Saturday morning in a private room in the company's main office. Members of the staff of the safety department are present to furnish statistics and any other aid or information desired. At the first meeting, a chairman and secretary are elected. Copies of the formal reports covering all accidents of the type being studied during the previous year are furnished the committee, which goes over each report separately, the secretary making notes as to responsibility, cause and other pertinent factors on a ruled form provided for the purpose.

When all the reports have been studied, the committee analyzes the notes, selects a subject for the bulletin and prepares a brief statement of their conclusions on this topic, together with recommended safe practices to be followed to prevent recurrence of the particular injury discussed. Mimeographed copies of the bulletin, over the signatures of the committee, are furnished each sectional foreman and other supervisors. Following receipt of a bulletin, each sectional foreman passes the contents on to his men and instructs them as to any recommendations therein. Such recommendations thereafter have the status of company safety rules.

After the sectional foreman has properly instructed his men, he submits a signed statement to that effect to his mine foreman. The mine foreman then questions as many of the men as possible to determine if they correctly understand the recommendations. When he is satisfied that all men have been properly instructed he signs a statement to that effect beneath the signature of the sectional foreman and submits it to the colliery superintendent. When all employees concerned have been instructed in accordance with the bulletin's recommendations, the colliery superintendent reports that fact to the management.

Bulletins issued by the Key Men's committees promote safety in a number of ways. They sell ideas to a foreman in a psychologically sound way because he does not feel that a bulletin is just another dictum from some higher-up who does not have to worry about how the job is to be done. Also, the bulletin comes from men who have obtained results by applying the rules they suggest. Sectional foremen and workmen, therefore, cannot logically oppose the practicability of the suggestions. Committee members also profit. Study of numerous accident reports and preparation of the bulletins broadens their outlook on



Cards such as this are awarded to Safety Key Men to hang in their offices or working sections.

Four Examples of Mining Safety Bulletins Prepared by Safety Key Men's Organization Committees

SAFETY KEY MEN
BULLETIN NO. 16
April 29, 1939

ISSUED BY COMMITTEE ON EXPLOSIVES AND ELECTRICAL INJURIES

TO ALL INSIDE OFFICIALS:

Injuries caused by men being struck by flying pieces of coal from blasting can be avoided by every miner in our mines conscientiously taking four simple precautions before firing a blast. These precautions are:

1. Properly guard the approach to the adjoining place when there is any possibility at all of the shot breaking through into that place when tapping or about to tap a chamber, gangway, airway, counter or crosscut. This precaution is of the utmost importance.
2. Take the precaution to warn the men in the adjoining and other nearby places that he is about to fire by notifying them where and when he is going to fire.
3. Assure himself beyond any possibility of doubt that each and every one of his laborers are in a safe place before he fires.
4. Give an alarm by calling "FIRE" very loudly several times before firing the blast.

If these simple precautions are observed, accidents of this character will be entirely eliminated.

COMMITTEE ON EXPLOSIVES AND ELECTRICAL INJURIES
JOHN R. PETTIGREW, Chairman
Mine Foreman, Birdseye
JOSEPH NIXON, Secretary
Sectional Foreman, Olyphant Shaft
THOS. L. MORGAN
Mine Foreman, Eddy Creek Shaft
MICHAEL WALSH
Sectional Foreman, Delaware

SAFETY KEY MEN
BULLETIN NO. 3
December 17, 1938
ISSUED BY COMMITTEE ON ROOF FALLS

TO ALL INSIDE OFFICIALS:

Analysis of the roof-fall injuries which occurred during the period January to September, 1938, showed that 16% of the total injuries occurred while miners were barring down loose material. It also developed that in most cases the fault has been in not using the proper type bar, the one in use being either too short or bent, and the fact that the miner did not have good footing and slipped while barring down material.

The Committee recommends that an examination be made by inside officials of all bars, wedges, etc., and that they see that all bars are at least 6 feet long, well pointed and straight.

The Sectional Foreman should take each miner and show him how he should handle himself when taking down loose material by the following methods:

(a) Instruct him how to test his roof for sound, and by holding fingers against roof for vibration.
(b) Instruct him that he must determine the extremities of the bad roof so as to place himself outside of the affected area.
(c) Show him how he should stand in order to have proper footing while using a bar; how and where he should stand to prevent a direct fall hitting him and how and where he should stand to prevent a slide from hitting him.
(d) Instruct the miner that he should place himself in such a position so that there would be no obstacles (props, chunks of rock, boards, chutes, etc.) in his way in case of the necessity of a quick retreat.
(e) Instruct the miner that a wedge should be used when the material to be pulled down is too strong to bar down.

COMMITTEE ON ROOF FALLS
WENDELL DAVIS, Chairman
Mine Foreman, Jermyn
ELMER WILLIAMS, Secretary
Sectional Foreman, Delaware
THOMAS H. GRIFFITHS
Sectional Foreman, Marvine
EDWARD J. MYRICK
Sectional Foreman, Eddy Creek
FRANK LOFTUS
Sectional Foreman, Olyphant
JAMES DAVISON
Safety Inspector

SAFETY KEY MEN
BULLETIN NO. 1
December 1, 1938
ISSUED BY COMMITTEE ON ROOF FALLS

TO ALL INSIDE OFFICIALS:

The Committee's analysis of the roof-fall injuries which occurred during the period January to September, 1938, inclusive, shows that 31% of the total injuries happened while standing props or timbers. This seems to indicate carelessness on the part of the workmen in not properly testing the roof or bringing down loose material before standing timber.

The Committee recommends that all Sectional Foremen advise their employes of these facts—then actually show them how to test the roof properly in approaching the area to be propped or timbered, and also the safe way to trim down all loose material before attempting to stand the prop or timber.

COMMITTEE ON ROOF FALLS
ELMER WILLIAMS, Chairman
Sectional Foreman, Delaware
WENDELL DAVIS, Secretary
Mine Foreman, Jermyn
THOMAS H. GRIFFITHS
Sectional Foreman, Marvine
EDWARD J. MYRICK
Sectional Foreman, Eddy Creek
FRANK LOFTUS
Sectional Foreman, Olyphant
JAMES DAVISON
Safety Inspector

SAFETY KEY MEN
BULLETIN NO. 19
June 10, 1939

ISSUED BY COMMITTEE ON SLIPPED AND FELL INJURIES

TO ALL COLLIERY OFFICIALS:

It is surprising to note that out of a total of 72 "Slipped and Fell" injuries, 52, or 72.2%, were caused by carelessness.

Carelessness is defined as follows:

HEEDLESSNESS
NEGLECTFULNESS
LACK OF ORDERLINESS

What are you and your men guilty of? A check-up on yourself and each individual of your organization and your working conditions is the answer to a reduction in the number of slipped and fell injuries caused by carelessness.

COMMITTEE ON SLIPPED AND FELL INJURIES
A. M. BROWN, Chairman
Mine Foreman, Miles Slope
PATRICK J. BEATTY, Secretary
Sectional Foreman, Olyphant Shaft
ROBERT H. ANDERSON
Maintenance Foreman, Olyphant-Eddy Creek
ELMER R. WILLIAMS
Ventilation Inspector

safety questions, stimulates them to continue their accident-prevention efforts and thus helps forestall the letdown that naturally follows a long-sustained campaign.

The bulletins, it is true, do not introduce new ideas on safety very often because our experience has been analyzed so thoroughly in the past that we already are well acquainted with the various types of injuries and ways of preventing them. However, they do furnish a novel, timely and authoritative means of repeating safety rules already in effect, as well as an excellent method of introducing new rules and modifying old ones.

Forty-five bulletins were issued by the committees in 1939. These have been reprinted in a convenient pocket-sized booklet for distribution to our foremen. Upon reading these bulletins, one is impressed with the fact that they have achieved a much-needed integration of the various safety rules applicable to the particular hazards with which they deal. General bulletin form and content are shown in the examples reproduced elsewhere in this article.

Fatalities Investigated

When a fatal accident occurs the appropriate committee is summoned to investigate. It visits the scene as soon afterward as possible, looks into attendant circumstances, questions witnesses and immediately prepares a report for transmission to the assistant general manager. This investigation and report are separate and independent of the customary investigation by the company's safety department.

In initiating this practice of accident investigation by the Key Men's committees, the management visualized several salutary effects. First, it stimulates supervisory officials to greater efforts in the discovery and elimination of hazards which might cause fatalities. Second, we get the opinion of several disinterested yet competent observers on the cause and prevention of our fatal accidents. Third, it broadens the viewpoint of the Key Men, who have shown by their records that they are the men most likely to grasp the lessons of experience. Further, through the Key Men, the knowledge gained from close contact with the circumstances attending fatal accidents is more widely disseminated. In every case where a committee has investigated an accident, it is worth noting that it has gone about it zealously and exhaustively, yet with utmost fairness and

impartiality. The result has been greatly enhanced respect for the Safety Key Men's Organization.

As it still is only 18 months since the inception of the organization, it is obvious that we cannot say yet what permanent effect it will have on our accident record. However, as we have watched the development of the plan we have become convinced of its soundness and merit. It will, of course, require two or three years to obtain significant statistical results. But though the effectiveness of the program cannot yet be shown by figures, the attitude of employees and non-member officials furnishes one means of gaging its anticipated value. The general run of our employees seem greatly impressed. Non-member officials invariably are found to be striving to make a record that will qualify them for admission to the organization. The result is an improved mental attitude and more constant attention to the accident-prevention problem. Efforts by non-member officials with records which, though excellent, still are just a little short of qualification, are particularly noteworthy.

The second annual banquet of the Safety Key Men was held Oct. 28, 1939, at which time twelve additional foremen qualifying during the year were admitted, bringing the membership to 55. How these Safety Key Men compare in number with the total employed is shown below:

Classification	Number in Safety Key Men's Organization	Total Employed by Company
Sectional foremen...	29	106
Mine foremen.....	11	17
Maintenance foremen	6	17
Outside foremen....	2	11
Driver bosses.....	1	7
Breaker foremen....	1	6
Miscellaneous	5	9
Total	55	173

We can do no better, in conclusion, than to reiterate the two basic thoughts behind the plan: (1) to single out for deserved honor and recognition those supervisory officials who have achieved outstanding safety records and (2) to utilize the talents and prestige of such officials in the most advantageous manner in the furtherance of safety work.

LOADERS IN 40-IN. COAL

Where 14 In. of Top Must Be Taken

Make Possible 13.2 Tons per Man Underground

With an average of 14 in. of rash and drawslate to be handled, the Monitor Coal & Coke Co. is mining the 40-in. Eagle seam in Logan County, West Virginia, with mobile loading machines accompanied by slabbing units for cutting in the rash over the coal. Performance in August, 1939, was 13.2 tons per man employed underground.

By ARTHUR DOWNING

Vice-President, Monitor Coal & Coke Co. Wilkinson, W. Va.

MINING what is termed the Eagle seam in Logan County, West Virginia, the Monitor Coal & Coke Co., Wilkinson, W. Va., now uses low-vein mobile loading machines to recover an average of 40 in. of coal under 9 to 15 in. of rash and 4 to 15 in. of drawslate. An average of 14 in. of these impurities must be handled by gobbing or loading out, and under these conditions performance per man employed underground was 13.2 tons of coal per shift in August, 1939. Impurities handled brought the total output per man employed underground (coal and impurities) up to 19.3 tons per shift.

The third company in Logan County to ship coal, Monitor started operations in 1905 and has been under the same management ever since. Until 1930, when the Eagle seam was opened, mining was done in the Island Creek seam. The organization has experimented with mechanical loading since 1921 and was the first in West Virginia to load coal with a Joy machine. In 1922, a Goodman power shovel was put to work, and in 1926, over a period of six months, two power shovels loading into 3-ton cars averaged 275 tons per shovel per shift. In all, these shovels handled over 300,000 tons of Island Creek-seam coal. Scraper loaders also were tried by the company in 1923.

The Eagle-seam mine, with which this article deals, was opened in 1930 with the idea of mechanizing it from the start. Accordingly, an experimental Joy 8BU loading machine was purchased and used for about six months. But with the economic conditions prevailing in 1931, mechanical loading was abandoned for a time in favor of hand loading, which also was considered the safest in view of the physical conditions encountered in extracting the Eagle coal.

Changing economic conditions, however, compelled a revision of viewpoint in 1938, with the result that the management again decided to experiment with mechanical loading to see if a system for future mining could be developed which also would

assure the requisite safety for employees. In this adaptation of mechanical loading to the difficult conditions encountered underground, C. A. Cook, general superintendent, took a vital part.

The first step was to thoroughly overhaul the 8BU machine purchased in 1930 and put it to work driving a six-heading entry two shifts a day. In the first fourteen days of work, in April, 1938, the machine averaged 165 tons per shift. In May, we decided to put the loading machine on a two-shifts-per-day five-days-per-week schedule. The average output over the month was 189 tons per shift or 378 tons per day of two shifts. In view of this performance, the management decided that there were great possibilities in mechanical loading and consequently ordered two more 8BU machines for delivery in July and October, the idea being to place the old machine on the spare list and use the new ones in active coal production. The new machines actually arrived in August and November, and, as they had to be coupled with Goodman slabbing machines, a new slabber also was ordered, arriving late in November, 1938.

Arthur Downing

Active working place in No. 3 haulage heading. Heavy broken line indicates center line of track to face 35 ft. from the camera position. Top portion of the 40-in. seam appears at the extreme left. In this heading an effort was made to hold the 40-in. immediate slate top but it came down anyway. Even so, headers will be required to support the remaining intermediate slate.

Here, in No. 4 Main, 20 in. of rock is taken down. C. A. Cook, general superintendent, inspects the top cut, which in this case was made in the coal because here the frail top is principally sandstone.

Because of broken working time in December, 1938, and January, 1939, mechanical-loading results were not good. In February and March, 1939, however, the machines worked five days a week and two shifts a day, or a total of four working shifts each day. In March, the daily average was 798 tons, or 198 tons per machine-shift. At first glance, this doesn't appear to be anything to brag about, as lots of Joy loaders are getting 300 tons or more per shift. However, conditions in the mine should be taken into consideration before passing judgment. All the coal came from two sets of six-heading entries with crosscuts driven 80 ft. apart. Ten of the headings were 20 ft. wide and the other two were 18 ft. wide.

Average coal height is 40 in. and the average thickness of impurities which must be handled is 14 in. The cutting is done in the hard rash over the coal, using a Goodman 824-BA low-vein slabber. Rash thickness, as noted above, is 9 to 15 in. Cuttings and other material out of the top must be gobbed or loaded out. Every shift, more or less, there always are one or more places with 20 to 24 in. of rash and drawslate. Each place is timbered with four posts and half-headers. Safety posts also are set in each place.

In June and July, 1939, an average of 24 in. of impurities was encountered in each working place, and in some places the rash and drawslate aggregated 36 in. All this material was gobbed or loaded out. In August, there was an improvement in these conditions, with the result that the

average output per loader per shift rose to 217 tons. Working conditions, equipment and number of men employed for this tonnage are summarized below.

Working Places

Two sets of entries (six headings each on 45-ft. centers).

Heading width: ten headings, 20 ft. Two headings, 18 ft.

Top taken where necessary in the two 18-ft. headings to provide a clear height of 5 ft. 6 in.

Seam Thickness and Natural Conditions

Average height of seam, 40 in.

Impurities: rash (over the coal), 9 to 15 in.; average, 12 in. Draw-slate (in some places), 4 to 15 in.

Average impurities handled (partly gobbed and partly loaded out), 14 in.

Mine Equipment

Two Joy 8BU loading machines.

One Joy 8BU loading machine (1930 model, held as a spare).

Two 824-BA Goodman low-vein slabbing machines.

Six Chicago Pneumatic Tool Co. electric coal drills.

Four 6-ton General Electric gathering locomotives.

Two 10-ton General Electric trip locomotives.

One 6-ton General Electric gathering locomotive (used as booster).

One hundred and seventy 3-ton mine cars.

Necessary shovels, bug-dust shovels, steel brooms, etc.

Cycle of Work

1. Set four posts with half headers.
2. Lay track to face.
3. Cut in the rash over the coal.
4. Gob or load out cuttings and other top material which comes down.
5. Sweep out cut, brush coal face, and clean up and sweep floor.
6. Drill shotholes.
7. Charge and tamp holes and fire shots.
8. Load coal with machine, first setting any necessary safety posts.

Working Force—August, 1939

Men at the face	59
Section bosses	4
Foremen	1
Superintendents	1
Supply men	4
Pumpmen	1
Firebosses	1
Trip-motor crewmen	4
Trackmen, main-line	2
Tipple and shopmen	14*
Office and supervision	4
Total	96*

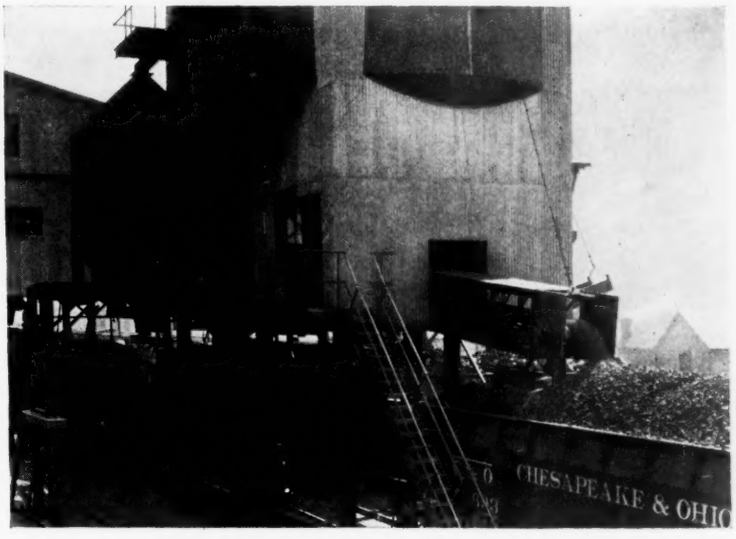
* Does not include refuse disposal on the surface, which is contracted.

Production—August, 1939

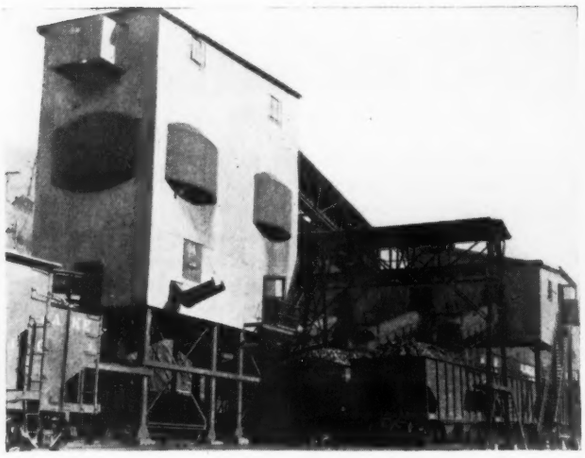
Total loading-machine shifts worked	91.00
Number days worked	23.00
Tons coal loaded	19,779.50
Average tonnage per loader per shift	217.36
Daily average output (four machine-shifts)	859.98
Tons of impurities handled (estimated)	9,400.00
Total tonnage material handled (coal and impurities)	29,179.50

Instead of putting in a cleaning plant to take care of the impurities over the seam, we decided to cut them out with the slabbing machines and thus save the cost of cleaning equipment. These impurities are disposed by hand, four men each shift being allotted for this purpose. Incidentally, it might be mentioned that there are two schools of thought on the question of handling gob. We have tried doing it both by hand and with

In 6th Left heading. Coal thickness is 40 in. and 18 in. of slate is taken down. Here, the cut was made in the slate. Headers, 6x8 in., support the intermediate top, which is 3 to 18 ft. of slate below a strong sandstone.



Storage bins for rescreener sizes and nut-coal loading conveyor at Eagle mine.



Eagle-mine preparation plant. Rescreens are built into the loading booms and also into the loading facilities in the rescreening plant.

Showing the chutes which conduct degradation removed on the top runs of the loading booms to the bottom strands for return to the tipple.

loading machines, and have found hand methods the better. Loading machines are bought to load coal and when attempts are made to apply them to two jobs it will be found that both of them suffer.

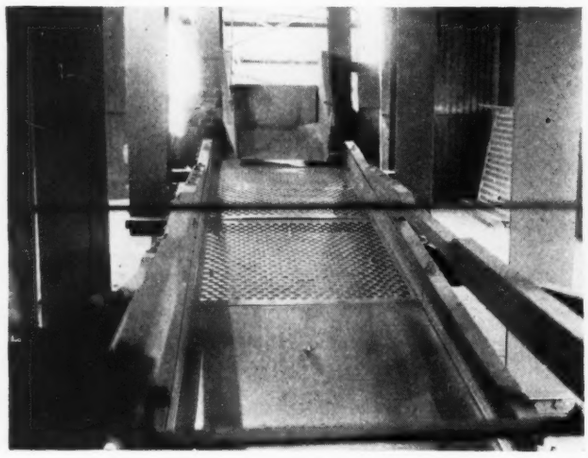
In discussing performance, I might state that on some shifts we get as high as 260 tons and on others only 110 tons. Breakdowns naturally occur with any machinery, but it is the average for the month that counts. I believe that under the conditions prevailing in the Eagle mine the statistics given above represent a creditable performance. With these same conditions, this average can be duplicated any month. In fact, we are not satisfied and constantly are trying for better figures. Probably the new-type machines now coming out would step up our production some 10 or 15 per cent, and some day I hope to try out this opinion.

The projected remaining life of the Eagle mine is 25 years. The coal moves into the domestic, steam and byproduct markets, and is hauled 7,500 ft. from the face to the slope bottom against heavy adverse grades. The 3-ton cars, after being weighed on a Buffalo scale with Streeter-Amet recorder, are dumped underground by a Link-Belt gravity-type rotary dump. A 600-tons-per-hour (maximum) slope belt 48 in. wide and 289 ft. long (centers distance) delivers the coal to the surface.

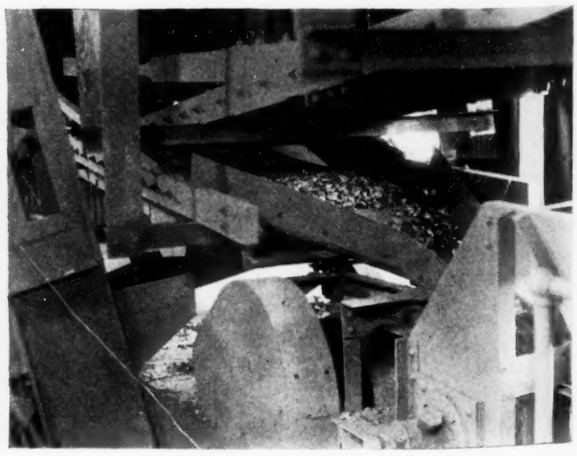
Built in 1930 by the Link-Belt Co., the Eagle-seam preparation plant includes ultra-modern provisions for handling, picking and rescreening the mine product. The slope belt delivers to a 7-ft.-wide shaker screen composed of eleven 3-ft. 8-in. sections. A mixing conveyor is installed between the ends of the three picking tables and their accompanying loading booms. Each boom includes a rescreen and the bottom runs of the boom conveyors return the fines to the tipple. Ordinarily, both slope belt and tipple are operated at one-half the rated capacity.

Steel-and-concrete construction features the preparation plant, which is equipped with four loading tracks. Six primary sizes of coal are produced but possible variations and combinations run up to 100 or more. Stoker and other small sizes are prepared in a rescreening plant which also includes rescreens in the loading equipment between bins and railroad cars. The larger size is deposited in the car by a belt boom.

Power to operate the Eagle mine in August, 1939, exclusive of house lighting, averaged 6.93 kw.-hr. per ton of coal shipped. Cost, excluding the demand charge, was 1.29c. per kilowatt-hour, or 8.94c. per ton.



This high-speed shaker (175 r.p.m.) is installed above the bins in the rescreening plant.



Coal leaving the rescreening plant gets a final screening before it enters the railroad car.

HYDRAULIC BREAKING UNIT

In Use at New Monarch Mine Supplies Coal for Two Loading Machines

Supplying coal for two loading machines each getting 300 to 320 tons per shift, which also is the mine average, a hydraulic coal-breaking process in use at the New Monarch mine in Illinois brings down some ten faces in a 7-hour shift. The process, in a semi-commercial stage of development, employs tubes expanded by oil pressure.

By CHARLES H. LAMBUR, Jr.
Assistant Editor, Coal Age

LATEST in the series of commercial developments in breaking down coal is the hydraulic "mining" process used at the New Monarch mine of the Consolidated Coal Co., Herrin, Ill. Starting with hand picks, coal-breaking mediums have included black powder, high explosives and carbon dioxide and air in steel shells, in addition to various mechanical and hydraulic breakers. An accompanying development has been the use of mining machines to cut or cut and shear the face to ease the breaking problem and increase the output of coarse coal. At New Monarch, recovering the Illinois No. 6 seam, one hydraulic unit breaks down coal for two loading machines, each averaging 300 to 320 tons per shift, which also is the mine average. This necessitates bringing down around ten faces in a 7-hour shift.

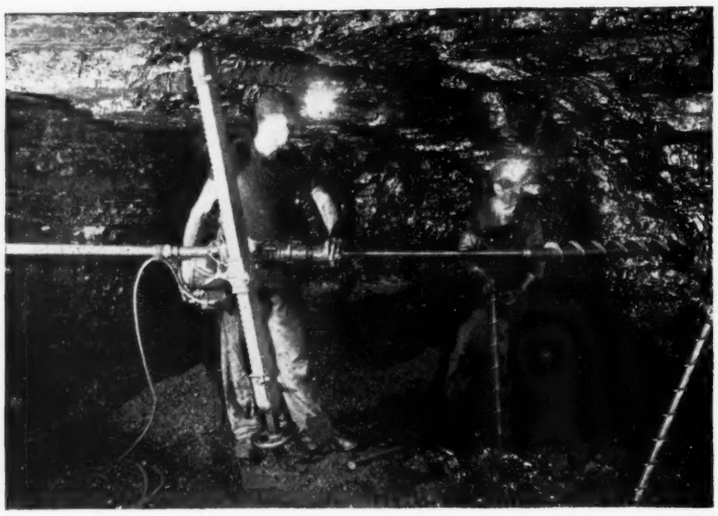
Average thickness of the seam at Herrin is 8½ ft., of which about 1 ft. is left in place in the top. Over the coal is slate and beneath it is fireclay. The seam carries the characteristic No. 6 "blue band" about 18 in. above the bottom, and the coal is tough and springy. Mining is based on the usual Illinois room-and-pillar system, using Joy 5BU mobile loading machines and mine cars. Underground equipment is operated by direct current at 275 volts.

The process employed is based on United States Patent No. 1,808,162, issued to Samuel G. Frantz and covering an expansible tube designed to break coal or other materials by hydraulic pressure. Exclusive rights under the patent were acquired by E. I. du Pont de Nemours & Co., Inc., early in 1938. Since that time, the du Pont organization has been carrying on work to incorporate this tube into a process which would be economically feasible and otherwise attractive to the coal industry. Experimental work has been done in Pennsylvania, Ohio, West Virginia and Illinois, with the most extensive development taking place in the last-named State at the New Monarch mine. The results obtained to date have been promising enough that the process will be placed on the market to a limited extent. However, it is still in the development stage and future work is necessary on the details of commercial practice. Much of the success attained thus far in the development program is attributed by du Pont to the advice and cooperation of the officials and personnel of the Consolidated Coal Co.

During the past two years, experiments have been devoted chiefly to improvement of hydraulic tube life. In the last ten months, semi-commercial development was effected and the machine has broken coal consistently. The process is not applicable to breaking coal off the solid. However, it is believed that breakage with a top cut is feasible provided the coal is not too high and there is a satisfactory bottom parting.

The unit includes three hydraulic tubes, two of which are 7 ft. long.

Tube close-up. The 4-ft. tube is shown expanded at the left, with both expanded and deflated 7-ft. tubes to the right.



Drilling a 5½-in.-diameter 8-ft.-deep hole, using a special cutting head on the auger.

Placing a tube in a 5½-in.-diameter drillhole.

Pushing tubes to the backs of Nos. 1 and 2 holes (Fig. 1).

The third, locally termed the "shorty," is 4 ft. long and is used for supplementary breaking (squaring up the face, rolling coal to the front, etc.). Pump, driving motor, and auxiliary electrical and hydraulic control equipment are made into a self-contained unit which, in the experimental machine, is mounted on mine-car trucks to permit movement by a locomotive. Power is supplied by a trailing cable and a flat steel top provides a place for carrying the tubes and hose while moving, thus making it unnecessary to disconnect them. Self-propelled units for operation in coal seams over 4 ft. thick are being built with both caterpillar and track mountings. Smaller units for lower coal are in process of design and construction. All are assembled to meet Bureau of Mines requirements for complete permissibility.

Pressure to expand the breaking tubes is applied by a 2,500-lb.-per-square-inch maximum-pressure hydraulic pump. It takes the hydraulic medium (special oil of low inflammability) from a 50-gal. storage tank and forces it through a ¾-in.-diameter armored and Neoprene-lined hose into the expansible tube. The pump is driven at 1,200 r.p.m. by a 7½-hp. motor operated by pushbuttons. Length of time required to build up pressure is controlled by a bypass valve set to limit the cycle of pressure application from zero to final breaking of coal to a minute or less. A gage at the pump outlet registers pressure.

The pump (radial-piston design) is not a new development but a type long used in connection with hydraulic rams. It is made to act as a high-volume, low-pressure or low-volume, high-pressure unit, changing from one function to the other automatically and instantaneously, as required by the manner in which the coal breaks down. A series of valves controlling the flow of oil into the tubes are arranged so that one or more tubes may be pumped up at a time and also so that the oil from one tube may be drained back into the storage tank while another tube is being expanded.

The key to the entire hydraulic process is the ability of the tubes to stand the gaff. A tube consists of a hollow core of abrasion- and oil-resisting rubber with wall thickness of 1 in. This rubber core is inclosed in a mesh cover braided from cables of high-tensile-strength steel wire. At each end, the braid and rubber

WASTE IS OBVIOUS HERE!

however...

core are clamped firmly in a fitting consisting of a brass insert and an outside copper-coated steel sleeve. The sleeve is forced over the assembly of brass insert, rubber core and mesh cover by passage through a die. The inserts are tapped so that the high-pressure hose from the pump may be attached to either end of the tube, with the opposite end closed with a brass plug.

The outstanding feature of the expansible tube is the design of the braided cover. It is fashioned so that, as the tube expands, the cables in the braid reach an angle at which they lock and thereby prevent further distention. This characteristic automatically prevents excessive distortion of the inclosed rubber core. In addition, the restraining outside braid will not allow the rubber to expand into crevices where pinching might result in injury.

Unexpanded diameter of a tube is approximately 4¾ in. For a 7-ft.-long tube (sleeve to sleeve) the weight is 80 lb. Expanded diameter is about 7½ in. From 7½ to 11 in. is the maximum expanded diameter used, which is controlled at time of manufacture by the weave of the braid. Construction of tubes with different expansion limits is necessary because different kinds of coals require a variation in expansion for proper breaking. Tubes are made in lengths of from 3 to 7 ft. to fit the mining procedure in use.

A maximum pressure of approximately 2,000 lb. per square inch is applied to the tubes, although the front of a cut frequently begins to break at a pressure of 800 to 1,000 lb. It has been determined that for the process to be economical, each tube should break 1,500 tons of coal during its life. At the present time, at the New Monarch mine, tubes are breaking about 2,500 tons before failure.

The tubes require a 5½-in.-diameter hole, which in turn necessitated modifications in drill and auger design. Chicago Pneumatic No. 474 drills with safety collars on the threadbars are used. Augers are made in 3-ft. sections with specially designed cutting heads. In other words, a standard molefoot head accommodating double-ended cutting bits for drilling a 5½-in.-diameter hole is fitted with a welded-on pilot head, also employing double-ended cutting bits. This pilot head makes a 3-in.-diameter hole, and its use has resulted in faster drilling and smoother holes. The smoother the hole, the smaller the clearance required for easy insertion of the tube and consequently the smaller the loss of effective tube expansion. Two men operate each drill and each crew provides sufficient holes for breaking coal for one loading machine.

Places at New Monarch are undercut with a 9-ft. bar, making a 6-in. kerf. As with explosives, careful bugdusting is the rule. In a 28-ft.-wide place, ten holes 5½ in. in diameter and 8 ft. deep are drilled straight in, about as in Fig. 1. With permissible explosives eight holes would be required, or one less on each rib. Upon completion of preliminary face-preparation work, the breaking unit, operated by two men, is moved up to a convenient position, usually within 15 or 20 ft. of the face. Three 7x5x4-in. sprags, cut from ties, are placed 5 ft. back under the cut—each sprag midway between two groups of holes.

The bottom row of holes (Fig. 1) are broken one at a time, which procedure promotes fracture of the coal into lumps that can be loaded satisfactorily. With the top holes, simultaneous expansion of two holes at a time is preferable, which method gives a better spreading action along the roof. A flood lamp is installed on each pumping unit to light up the face and enable the operator to follow closely the breaking operation and determine when to use the 4-ft. tube. The floodlighting also promotes safety.

During the expansion cycle, one man tends the pumping unit while the other moves the hose about in his hands to keep it from being cov-

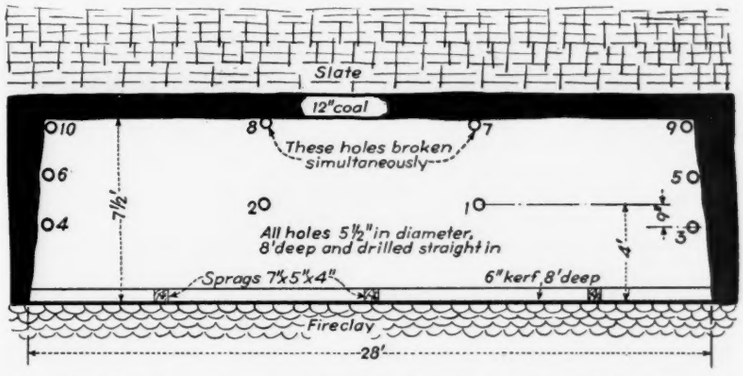


Fig. 1—Drilling plan for hydraulic breaking of a 28-ft. face at the New Monarch mine showing how the sprags are placed and the order in which the ten holes are broken.

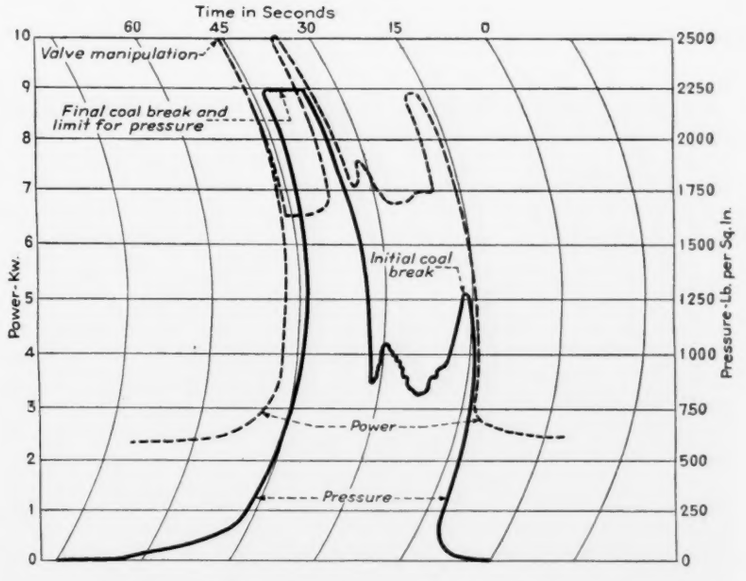
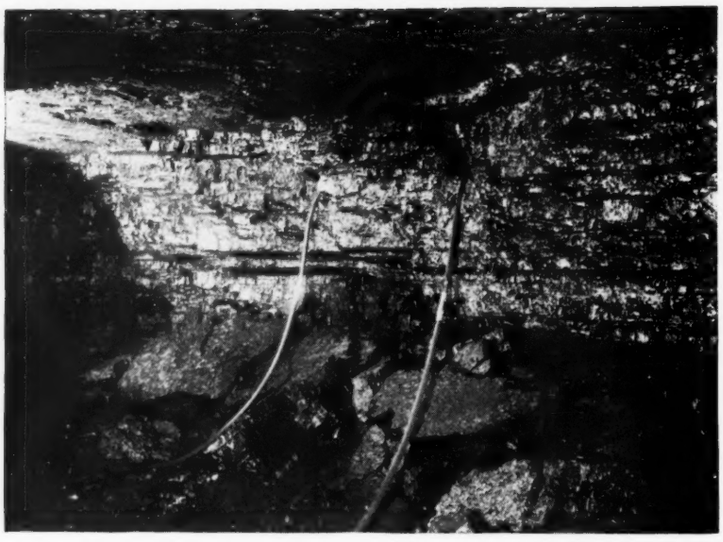
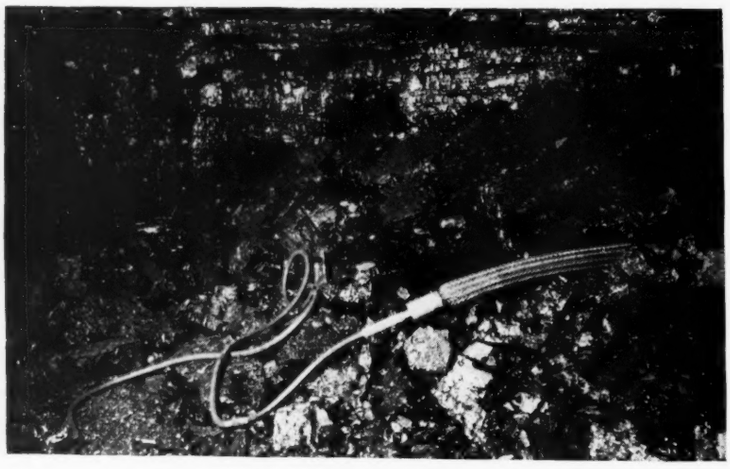


Fig. 2—Chart showing relationship between power and pressure as the hydraulic tube breaks down the coal. Elapsed time to break the hole in this instance was about 45 seconds.



The lower part of the seam has been broken down by expanding the tubes in Holes 1, 2, 3, 4, 5 and 6 (Fig. 1). The tubes now are in place in Holes 7 and 8.



The entire face now has been broken down and is ready for loading. In the foreground is the "shorty" tube lying on the loose coal.

Cut-away view showing tube construction.

ered with coal. Ordinarily, all the coal is broken down by the procedure outlined, using 7-ft.-long tubes, but occasionally auxiliary breaking is required, for which work the 4-ft. tube is employed. It is used in preference to a 7-ft. tube because it is easier to handle and concentrates the pressure in a smaller area. From 30 to 45 seconds is required to break a hole after a tube is in position and a complete room face is broken down in from 15 to 20 minutes. Power consumption in breaking three 28-ft. room faces and one 14-ft. entry face averages 0.0211 kw.-hr. per ton.

When hydraulic pressure is first applied to a tube in a drillhole, the tube expands and grips the hole throughout its entire length. As pressure is increased, coal at the front of the cut is broken down and the exposed portion of the tube expands until its maximum diameter is reached. The pressure then takes effect on the coal toward the back of the cut and progressive breaking occurs. As long as any portion of the hole remains intact, pressure is maintained on the tube and it stays firmly anchored in place. Therefore, it cannot fly from the hole. Since the tube must decrease in length as it expands, it is pulled back toward the unbroken portion of the hole, giving the impression that the tube is drawing itself into the coal. When the hole is completely broken, the tube lies on top of the loose coal.

As the tube is expanded, pressure is exerted against the surrounding coal until, in the line of least resistance, the seam breaks downward to the cut or toward the nearest of any other open face which may have been established. There is no shock or jar to make the coal fly or noticeably disturb the surrounding coal and strata. Because breakage takes place along natural cleavage planes there is a maximum of firm coarse coal. Reports on two screen tests at New Monarch show an 85 per cent increase in 2-in. lump compared with coal shot with permissibles during the same month.

Hydraulic breaking does not produce flame or dust and thus eliminates the danger of gas or dust explosions from that source. Absence of fumes, smoke and dust eliminates contamination of the ventilating current, thereby resulting in better air for the rest of the mine. Also, efficiency of the mining cycle is improved by elimination of the usual delay caused by waiting for fumes, dust and smoke to clear from the face.

MINE "SLATE" WASHED

In Isabella Plant Addition

To Reclaim Coal Content of 30 Per Cent

Reclaiming 125 tons or more of usable coal per day from an average output of 400 to 450 tons of mine "slate," a new addition to the Isabella washing plant also has simplified refuse-disposal. With the reclaiming plant designed to operate, if necessary, on either 100 per cent coal or rock—and with no addition to the preparation force—coal recovery in December and January was 30 per cent of the "slate" feed. The reclaimed coal averaged 10.04 per cent ash, 1.66 per cent sulphur and 3.59 per cent surface moisture.

By IVAN A. GIVEN
Associate Editor, Coal Age

TURNING a liability into a definite asset, the Weirton Coal Co. has installed an addition to the washery at its Isabella (Pa.) mine consisting of a crushing, washing and dewatering plant for the recovery of 125 tons or more of usable coal a day from mine refuse, or "slate." This addition, termed the "reclaiming plant," *does not* wash pickings, re-treat wash-box refuse or have any connection with preparation of the regular metallurgical coal. Instead, it works on straight mine "slate" to produce what is termed "reclaimed coal." Since it works on only mine "slate," the equipment in the reclaiming plant is designed to handle a feed varying from 100 per cent coal to 100 per cent rock, which represents the two extremes which might possibly be encountered. This plant is the first installation of its kind, and constitutes a pioneering venture in the utilization of the natural coal resources to their fullest extent.

Preparation Modernized

Isabella mine (see July, 1938, *Coal Age*) supplies metallurgical coal to the Weirton Steel Co., and, as one step in a comprehensive modernization program inaugurated in 1937, a complete new blending, washing and dewatering plant went into service in 1938. At the same time an aerial tramway with a capacity of 65 tons per hour was installed for disposing of both preparation-plant refuse and mine "slate."

Part of the "slate" is of necessity created in mining, while the remainder might be termed accidental. The Pittsburgh seam being worked is overlaid by an average of 12 in. of drawslate. Over the drawslate is 3 to 6 in. of "rooster" coal, which is high in ash and sulphur as compared with that part of the main seam recovered for metallurgical purposes. To keep the drawslate up, with the exception noted below, 8 to 12 in. of "head coal," also comparatively high in ash and sulphur, is left in place. The exception are the haulageways, where the head coal, drawslate and rooster coal are taken down for height. This conglomerate is classed as "slate" and must be loaded out for disposal on the surface.

Another source of "slate" naturally is falls. Crossing old openings where the passage of years has resulted in extensive caving also yields "slate," which likewise is loaded out. In this operation, considerable bottom coal, normally left down because of lower quality, is picked up. Total output of "slate" from all sources, with the mine production set for the coking-plant requirements, averages 400 to 450 tons per day. Before the reclaiming plant was installed this entire production was brought to the surface and wasted between the two regular working shifts.

Reclamation Studied

For some time the management deliberated on possible ways and means of reclaiming the coal in the "slate" and finally conducted a series of tests which showed that 30 per cent of the product was coal which could be washed to under 10.5 per cent ash and 2.2 per cent sulphur. After preliminary studies of plant design had been worked out, it was estimated that coal for use in boiler plants in the steel mill at Weirton, W. Va., could be reclaimed and delivered at Weirton at a cost sufficiently lower than purchased coal of a similar analysis to warrant the investment in a reclaiming plant. It was further realized that such a plan would improve the waste-disposal problem in the following respects: (1) reducing the quantity of material sent to the dump would postpone the necessity of shifting the position of tail towers of the aerial tramways and (2) reducing the size of the material would cut wear and tear on disposal equipment. Elimination of firing of the dump and trespassing by pickers would be additional benefits.

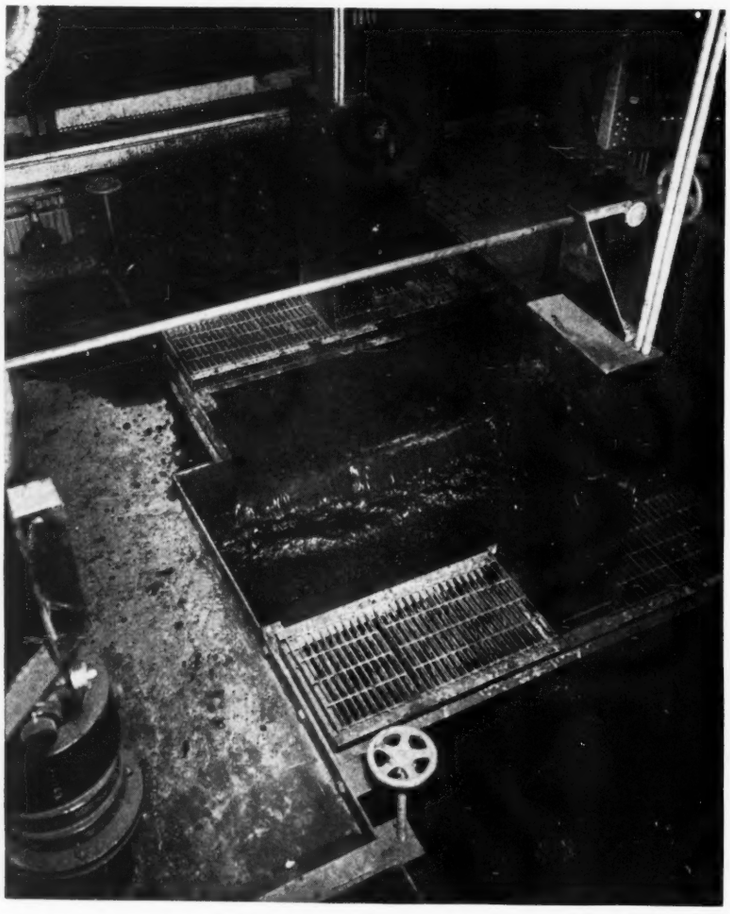
No changes in underground practice followed installation of the reclaiming plant. The "slate" is loaded

as necessary in the normal course of mining, and such "slate" cars are set out on a special sidetrack near the bottom. Then, after the regular working shift, the cars are brought to the bottom, weighed and dumped into the 70-ton hopper which discharges through a feeder onto the main slope belt. The above routine applies at the present time with one modification: namely, the establishment of a second class of mine waste known as "rock," or "barren" material, containing less than 5 per cent, or under ½ ton, of coal per car. If three or more such cars appear in a shift they are segregated and dumped separately directly to the aerial tramway. If less than three cars, the "rock" goes to the reclaiming plant along with the "slate."

Capacity of the reclaiming plant, designed and installed by the Link-Belt Co. in cooperation with the Weirton Coal Co. management and the consulting engineering department of the M. A. Hanna Co., was governed by the capacity of the aerial tramway, which, as mentioned earlier, is 65 tons per hour. However, on the assumption that 100 per cent refuse never would be encountered for an appreciable length of time, the reclaiming-plant capacity was set at 75 tons per hour, and a two-speed drive was fitted to the feeder under the 70-ton hopper at the slope bottom so the feeder would deliver 75 tons per hour when handling "slate" and 300 tons per hour when handling "rock."

Since the operating cost had to be kept to a minimum to make the reclaiming plant successful, any plan embodying the use of a picking table for removal of heavy rock showed too high a labor cost, and it was therefore decided to crush the entire feed to a size suitable for washing. The plant is run by one man, the wash-box operator, and the equipment and structural members are so arranged that this operator can see everything in the plant from the operating platform. Since the equipment in the reclaiming plant is of the same general design as that in the main plant, preparation men (who do their own maintenance) are equally at home in either. The reclaiming plant starts operation at 3 p.m., or a half hour after the main washery is shut down, and runs as long as material is available up to 7 p.m. It resumes operation at 3 a.m. after the second preparation shift, and again runs a maximum of four hours.

In operation, the 70-ton "slate" bin at the slope bottom acts as a surge bin and insures a steady feed to the reclaiming plant. Regulations forbid loading any piece of slate larger than 18x18x12 in., which thus becomes the maximum size of the raw feed to the reclaiming plant. "Slate" brought up on the main slope belt is bypassed into the reclaiming plant and first goes to a McLanahan & Stone 21x42-in. single-roll quarry-type crusher weighing 16 tons and driven by a 60-hp. motor. This crusher breaks the "slate" to 4 in. or under. Peripheral speed of the roll is 132 f.p.m. to minimize production of fines, and the tips of the conical teeth and certain parts of the backplate are hard-surfaced. The crusher product is carried to an elevating conveyor, which in turn discharges into the wash box.

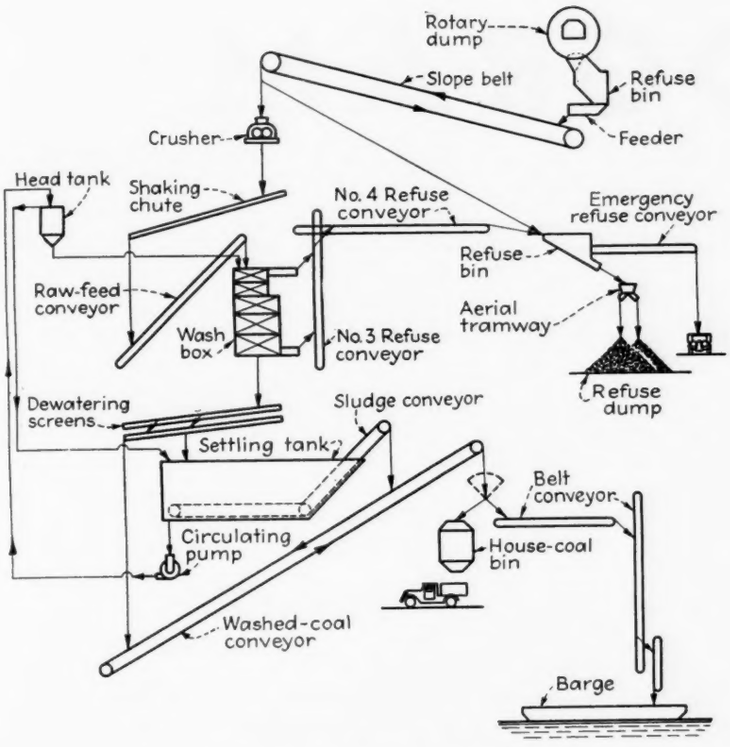


Coal is reclaimed and cleaned in this wash box shown in action at Isabella. The unit is designed to operate on 100 per cent coal or 100 per cent rock and all proportions between.

Four-Cell Jig Used

The wash box in the Isabella reclaiming plant is a 4-cell 2-compartment Link-Belt air-pulsated-jig unit with "electric-eye" reject control. As before mentioned, feed to the washer consists of "top coal" and "rooster coal," plus some "bottom coal," mixed mostly with drawslate, although some sandstone, limestone and flinty "horseback" material is encountered. Sink-and-float tests showed a sharp break at 1.60 specific gravity, with practically no carbonaceous material in the sink, while the float at this gravity fell within the desired ash and sulphur limits. Therefore, 1.60 was chosen as the washing gravity.

Special features incorporated in the wash box for handling the material known as "slate" include extra large refuse draws and a center draw in addition to the two regular draws. Elevators also are large (24 in. on the feed and 18 in. on the discharge end) and, in line with designing all equipment in the plant to handle 100 per cent coal or rock, the feed-end refuse elevator can handle the entire input to the box.



Flowsheet, Isabella reclamation plant.

Roughly speaking, the largest heavy refuse is thrown down in the first cell of the washer, with smaller heavy refuse in the second, and so on to the fourth cell, where the job is finished. All material carried up in the refuse elevators is discharged to the main refuse conveyor. Air to operate the wash box is taken from one of the blowers in the main washery via a branch duct and valve.

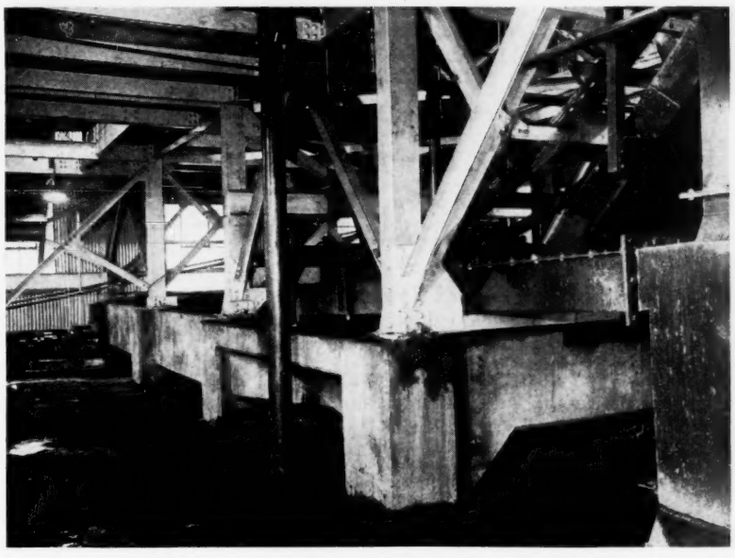
As the first cell is largely for taking out the largest and heaviest material immediately, no attempt is made to accomplish stratification and the strongest possible pulsation is used to move the refuse bed on the screen. The wash box is equipped with expansion chambers, and in No. 1 cell, where a high acceleration is desired, throttling is done ahead of the expansion chamber. On the other cells, throttling is done after the chambers.

The worst problem encountered in the initial operation of the plant was removal of the many pieces of old timbering wood from the clean coal. This was accomplished by installing a sulky-rake attachment, the curved tines dipping below the water in the wash box to catch the wood. By means of a lever, the rake can be raised and the collected wood removed.

"Reclaimed coal" from the wash box flows with the water onto shaking dewatering screens. The bottom shaker is fitted with $\frac{1}{8}$x$\frac{1}{2}$-in. slotted plate (staggered slots, with the long dimension in the direction of the coal flow). Oversize goes into a flight conveyor, which lifts it up to the belt system leading to the barge-loading terminal. Undersize and water drop down a spout into a partitioned box which prevents splashing. Upward velocity in the box is sufficient to carry up coal as large as $\frac{1}{4}$-in. to a flume which discharges into a concrete settling tank designed to settle everything coarser than 100 mesh. The settled product is removed by a scraper conveyor (11 f.p.m.) which discharges into the flight conveyor referred to above. Clarified water from the tank is recirculated to the wash box by a 1,500-g.p.m. Goyne centrifugal pump on the floor beside the settling tank.

As the new plant cut off the approach to the old house-coal bin, a new one was built and is fed from the reclaiming plant. By means of divisions in the dewatering screen and chutes the coal supplied to the house-coal bin is practically all $1\frac{3}{4}$ x4 in size.

The reclaiming plant was installed as an addition to the main washery, but, on account of ground conditions, the entire addition was set on a concrete mat. Regular operation of the reclaiming plant began Dec. 1, 1939. Average ash in the reclaimed coal in December and January was 10.04 per cent; sulphur, 1.66 per cent; surface moisture, 3.59 per cent; "slate" handled totaled 18,226 tons and reclaimed coal totaled 5,478 tons, a yield of 30.05 per cent. Weight of the plant feed is obtained directly from the mine-car weights. Weight of the reclaimed coal is obtained by adding the portion loaded into barges, determined by barge gaging, to that taken from the house-coal bin, which is checked by weighing trucks handling the coal.



Minus $\frac{1}{4}$-in. material is recovered and dewatered in this concrete settling tank in the Isabella reclaiming plant.

PROGRAM

17th Annual Convention of Practical Coal-Operating Men and National Mining Equipment Exposition

AMERICAN MINING CONGRESS

Music Hall, Cincinnati, Ohio, April 29-May 3

MONDAY • APRIL 29 • MORNING

Chairman: Julian D. Conover, secretary, American Mining Congress

Introducing: E. M. Douthat, vice-president, Sinclair Coal Co., and general chairman of the arrangements committee

Harry M. Moses, president, H. C. Frick Coke Co., and national chairman, program committee

R. L. Ireland, Jr., president, Hanna Coal Co. of Ohio, and chairman, Coal Division

Frank E. Mueller, vice-president, Roberts & Schaefer Co., and chairman, Manufacturers' Division

Face-Preparation Methods

Coordination of Face Preparation With Mechanical Loading
J. W. Anstead, Templeton Coal Co.

Face-Preparatory Operations
J. T. Parker, superintendent, Inland Steel Co.

The Floating Shot
James M. Godwin, Pocahontas Land Corporation

MONDAY • APRIL 29 • AFTERNOON

Applied Science

Educational Training in the Coal Industry
H. R. Wheeler, Pittsburgh Coal Co.

Underground Distribution of Power
K. L. Konnerth, electrical engineer, H. C. Frick Coke Co.

Roof-Support Problems in Long-Life Entries
Frank G. Smith, general superintendent, Sunday Creek Coal Co.

TUESDAY • APRIL 30 • MORNING

Surface Preparation

Economic Possibilities of Small Coal Cleaners
J. P. Horne, general superintendent, Raven Red Ash Coal Co.

Recovery and Utilization of Cleaning-Plant Refuse
K. A. Spencer, vice-president, Pittsburg & Midway Coal Mining Co.

Modern Coal-Cleaning Practice

(a) Appalchian Field
Joseph Pursglove, Jr., general manager, Pursglove Coal Mining Co.

(b) Rocky Mountain Field
Carl S. Westerberg, Utah Fuel Co.

TUESDAY • APRIL 30 • AFTERNOON

Mechanical Loading and Conveying

Duckbill Mechanical Loading
V. D. Picklesimer, South-East Coal Co.

Mobile Machines Loading on Conveyors
G. S. Jenkins, assistant general manager, Consolidated Coal Co.

Multiple Conveyor Units and Economical Operation
W. J. B. Mayo, Koppers Coal Co.

WEDNESDAY • MAY 1 • MORNING

Equipment Maintenance

Organization of Maintenance Crews in Mechanical Loading
Charles R. Nailler, Hanna Coal Co. of Ohio

Methods of Keeping Detailed Cost Records on Stripping Equipment and Operations

(a) Stripping and Loading Shovels
W. W. Youngblood, mining engineer, Midland Electric Coal Corporation

(b) Overburden Drilling, Shooting, Preparation and Haulage
C. W. Woosley, general superintendent, Pyramid Coal Corporation

Breakdown Prevention Through Machine Inspection and Service Records
Carr McCormack, Jr., New Castle Coal Co.

WEDNESDAY • MAY 1 • AFTERNOON

Mobile Loading Machines

Shuttle Haulage for Mechanical Loading

(a) Review of Developments
H. B. Husband, Fuel-Mine Operations, Chesapeake & Ohio Ry. Co.

(b) Operating Methods
H. S. Gay, vice-president, Gay Coal & Coke Co.

Track-Mounted Loading Machines
R. L. Adams, general superintendent, Old Ben Coal Corporation

Successful Pillar Recovery With Mobile Loaders
J. M. Connor, West Penn Power Co.

Stripping Round Table

The 35-Yd. Stripping Shovel
H. S. Richards, general manager, Tecumseh Coal Corporation

Development of 80-Ton Haulage Trucks
L. Russell Kelce, vice-president, Hume-Sinclair Coal Mining Co.

Armored Ground Cable for Transmission Lines
C. J. Rettenmayer and O. E. May, Northern Illinois Coal Corporation.

Carry-All Scrapers as Auxiliary Units for Overburden Removal
T. G. Gerow, chief engineer, Truax-Traer Coal Co.

THURSDAY • MAY 2 • MORNING

National Economic Problems

Effect of Utilization on Coal Production
E. C. Payne, Consolidation Coal Co.

National Legislation Affecting Coal Mining
Julian D. Conover, secretary, American Mining Congress

THURSDAY • MAY 2 • AFTERNOON

Safety

Safety Records, Hand vs. Mechanical Mining
L. E. Young, consulting engineer

Accident Sources and Overcoming New Hazards
L. A. Hill, Chicago, Wilmington & Franklin Coal Co.

Fixing Responsibility for Mine Accidents
E. W. Wynne, compensation adjuster

FRIDAY • MAY 3 • MORNING

Exhibitors' Day—no convention sessions. A list of exhibitors (totalling over 140) is given below.

CINCINNATI SHOW EXHIBITORS

Abbe Engineering Co.
Advertising Displays, Inc.
Air Reduction Sales Co.
Allis-Chalmers Mfg. Co.
Allis Co., Louis
American Brattice Cloth Corp.
American Car & Foundry Co.
American Chain & Cable Co., Inc.
American Cyanamid & Chemical Corp.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
Atlas Powder Co.

Barber-Greene Co.
Bemis Bro. Bag Co.
Bethlehem Steel Co.
Bixby-Zimmer Engineering Co.
Bowdil Co.
Broderick & Bascom Rope Co.
Brown-Fayro Co.
Brown, Inc., L. M.

Calcium Chloride Association
Cardox Corporation
Carnegie-Illinois Steel Corp.
Central Electric Repair Co.
Centrifugal & Mechanical Industries, Inc.
Chicago Pneumatic Tool Co.
Cincinnati Mine Machinery Co.
Cities Service Oil Co.
Coal Mine Equipment Sales Co.
Coffing Hoist Co.
Columbia Steel Co.

Deister Concentrator Co.
Deister Machine Co.
Deming Co.
Differential Steel Car Co.
Duff-Norton Mfg. Co.
du Pont de Nemours & Co., Inc., E. I.
Dustlix Corporation

Edison, Inc., Thomas A.
Electric Controller & Mfg. Co.
Electric Railway Equipment Co.
Electric Railway Improvement Co.
Electric Storage Battery Co.
Enterprise Wheel & Car Corp.

Flood City Brass & Electric Co.

General Electric Co.
Gibraltar Equipment & Mfg. Co.
Goodman Mfg. Co.
Gorman-Rupp Co.
Gould Storage Battery Co.
Gulf Oil Corp.
Guyan Machinery Co.

Haynes Stellite Co.
Hendrick Mfg. Co.
Hercules Powder Co.

I-T-E Circuit Breaker Co.

Jeffrey Mfg. Co.
Johnson-March Corp.
Joy Mfg. Co.

Kanawha Mfg. Co.
King Powder Co.
Koppers Co.
Koppers-Rheolaveur Co.

LaBour Co., Inc.
La-Del Conveyor & Mfg. Co.
Lee-Norse Co.
Leschen & Sons Rope Co., A.
Linde Air Products Co.
Link-Belt Co.

McGraw-Hill Publishing Co., Inc.
McLaughlin Mfg. Co., Inc.
McNally-Pittsburg Mfg. Corp.
Macwhyte Co.
Mancha Storage Battery Locomotive Co.
Marion Steam Shovel Co.
Mechanization, Inc.
Metal & Thermit Corp.
Mine Safety Appliances Co.
Mining Congress Journal
Morrow Mfg. Co.
Myers-Whaley Co.

Nail City Bronze Co.
National Carbide Corp.
National Carbon Co., Inc.
National Electric Coil Co.
National Malleable & Steel Castings Co.
National Tube Co.
Nordberg Mfg. Co.

Ohio Brass Co.
Ohio Carbon Co.
Osmose Wood Preserving Co. of America, Inc.
Owens-Corning Fiberglas Corp.

Penn Machine Co.
Pennsylvania Electric Coil Corp.
Philco Corporation
Portable Lamp & Equipment Co.
Post-Glover Electric Co.
Productive Equipment Corp.
Prox Co., Inc., Frank
Pure Oil Co.

Roberts & Schaefer Co.
Robins Conveying Belt Co.
Roebling's Sons Co., John A.
Rome Cable Corp.

Safety First Supply Co.
Sanford-Day Iron Works, Inc.
Shell Oil Co., Inc.
Simplex Wire & Cable Co.
Simplicity Engineering Co.
Socony-Vacuum Oil Co., Inc.
Standard Oil Co. (Ind.)
Stephens-Adamson Mfg. Co.
Sterling Pump Corp.
Sullivan Machinery Co.
Sun Oil Co.
Superior Carbon Products, Inc.

Talcott, Inc., W. O. & M. W.
Tamping Bag Co.
Templeton, Kenly & Co.
Tennessee Coal, Iron & Railroad Co.
Tide Water Associated Oil Co.
Timken Roller Bearing Co.
Tool Steel Gear & Pinion Co.
Tracy Co., Bertrand P.
Tyler Co., W. S.

Union Carbide & Carbon Corp.
Union Wire Rope Corp.
U. S. Bureau of Mines
U. S. Rubber Co.
U. S. Steel Corporation Subsidiaries

Viking Mfg. Co.

Watt Car & Wheel Co.
Weir-Kilby Corp.
Western Cartridge Co.
Westinghouse Elec. & Mfg. Co.
West Virginia Rail Co.
Wheat Lamp Sales, Inc.
Wilson Welder & Metals Co., Inc.
Wood Preserving Corp.

MILES OF SMILES FOR USERS OF TIMKEN BEARING EQUIPPED MINE CARS

From every point of the compass reports of outstanding performance by Timken Bearing Equipped mine cars constantly are coming in. They have been coming in for the past 19 years—ever since the first mine cars went on TIMKEN Roller Bearings. During the intervening period the total number of Timken Bearing Equipped mine cars has risen to more than 272,000. That represents 2,176,000 bearings. An overwhelming majority of these bearings still are on the job.

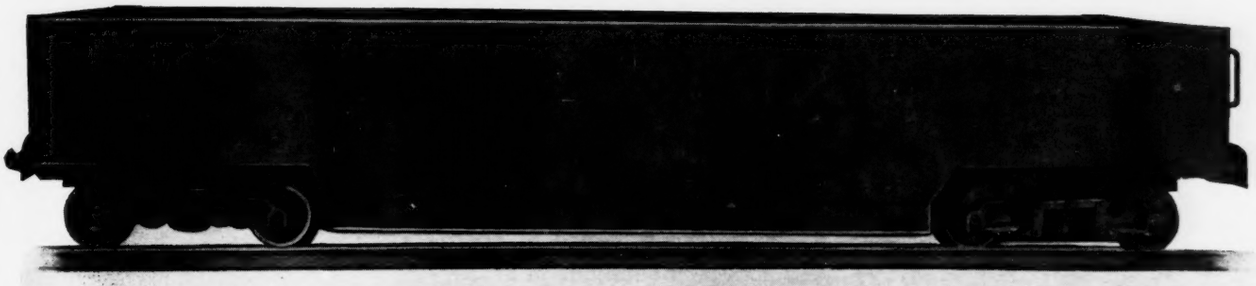
TIMKEN Bearings are dominant in mine cars because, besides having unexcelled smoothness, they stand up under the slam bang conditions of mine car service better than any other anti-friction bearings ever used in mine cars.

Behind every TIMKEN Bearing that goes in a mine car are the full research, engineering, manufacturing, testing and financial resources of one of the world's greatest industrial institutions. The mine operator can't lose—he *must* be satisfied, come what may.

Any mine car manufacturer can furnish cars equipped with TIMKEN Bearings. Be sure to specify and insist on them in the new cars you buy.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

60 NEW 10-TON MINE CARS GO ON TIMKEN BEARINGS



SEE US AT THE COAL SHOW
APRIL 29--MAY 3 BOOTH 618

These new mine cars were designed and built by American Car and Foundry Company for the Rochester & Pittsburgh Coal Company. They represent a radical departure from conventional practice in both design and construction, including a unique arrangement of 8-wheels and double knee action swivel trucks. Length, over body, 19′; overall 21′6″. Width, 6′6″. Capacity, 10 tons. Weight of car empty 8,000 lbs. Each car contains 16 TIMKEN Bearings.

The Rochester & Pittsburgh Coal Company has had a lot of experience with Timken Bearing Equipped mine cars, having upwards of 2,000 in service. Like hundreds of other mine owners this company has proved it pays to operate mine cars equipped with TIMKEN Bearings. "Miles of Smiles"!

TIMKEN
TAPERED ROLLER BEARINGS

Manufacturers of TIMKEN Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; TIMKEN Alloy Steels and Carbon and Alloy Seamless Tubing; and TIMKEN Rock Bits.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

DOMESTIC SALES

Still Open for Intensive Effort

Survey of Household Fuel Users Indicates

The fact that half the persons interviewed in the survey with which the accompanying article deals had never heard of dustless coal is one indication of the opportunities still existing for effective merchandising in the domestic-fuel field. And bearing on the future of coal is the additional fact, among others, that domestic consumers as a group have not yet been thoroughly impressed with the specific advantages of the coal stoker. This contrasts with definite opinions as to preferences for oil burners.

By DICKSON HARTWELL

Hartwell, Jobson & Kibbee
Public-Relations Counsellors
New York City

SUBSTANTIAL opportunities for effective merchandising work in the domestic-coal field are revealed in a survey just completed by the Research Division of Hartwell, Jobson & Kibbee. This survey of some aspects of retail distribution indicates that the field is wide open for effectively promoting the coal stoker as a clean, convenient and efficient heating unit operating on an economical fuel, and also that the public is only partially, or not at all, aware of some of the new developments in coal preparation which provide additional sales points. Only 44 per cent of the group surveyed, for example, had ever heard of dustless coal—a recent development viewed as a major element in merchandising coal to the domestic user.

The survey was conducted by the personal interview method widely used in polls of public opinion. The same method was followed in the *Coal Age* survey of the public's ideas of the coal industry, published in July, 1939, p. 33. Interviews were limited to a representative economic sample of actual fuel buyers in rented or owned homes—for the most part single or double houses in the Middle Atlantic and New England States, Ohio, Wisconsin and Colorado.

Of fundamental importance in a marketing survey is the attitude of present and prospective customers to the product. In this survey, this attitude is revealed by the fact that although 73 per cent of those interviewed reported the use of coal it is preferred in only 42 per cent of the cases, against 40 per cent for oil. Habit and economy are the most common reasons for preferring coal. Convenience is the principal reason for preferring oil.

The group covered in the survey used fuel and equipment in the following proportions:

	Per Cent
Plain (hand-fired) coal	61
Coal stoker	12
Oil	18
Gas	7
Coke	1
Wood	1

Of the persons interviewed, 62 per cent were home owners and 38 per cent were renters. These two groups used fuel and equipment in the following proportions:

Fuel Used:	Per Cent Owners	Per Cent Renters
Plain coal	53	76
Coal stoker	15	6
Oil	22	11
Gas	9	4
Coke	1	1
Wood	0	2

The popularity of the automatic furnace (fired with a coal stoker or oil burner) among home owners, who presumably are more willing to make the necessary substantial investment, is clearly shown by the fact that furnaces of this type were used by 37 per cent, compared with 17 per cent of the renting group. A cross check of several questions designed to show the preference of those interviewed revealed that the stoker and the oil burner stand about even, as shown below:

	Per Cent Prefer
Plain coal	2
Coal stoker	39
Oil burner	40
Gas	3
Don't know	16

Despite the approximately equal preference for the stoker and the oil burner, an unusually large percentage of those now using the coal stoker prefer oil, against a comparatively small number of oil users that would like stokers. What the present users want is shown below:

	Now Using—		
Preference:	Plain Coal, Per Cent	Stoker, Per Cent	Oil, Per Cent
Plain coal	1	0	4
Coal stoker	45	54	11
Oil	38	33	78
Don't know	16	13	7

It is evident from this that the old-fashioned coal furnace enjoys very little prestige. In other words, it is not unreasonable to assume that an automatic stoker priced and offered on terms within the reach of the aver-

age buyer would almost completely supplant the old type of equipment.

Reasons for preferring the coal stoker and the oil burner also were determined. Included in the so-called "habit" preference given below are such replies as "I just like it," "It suits me," "I don't know," etc. It is interesting to note that a distinctly greater number fall in this classification among those voting for the stoker than those preferring oil.

Reason for Preference:	Stoker, Per Cent	Oil, Per Cent
Convenience	5	42
Economy	22	15
Cleanliness	10	22
Heating qualities	9	12
Safety	10	0
Habit	35	7
Miscellaneous	9	2

Obviously, little effective use has been made of the convenience appeal of the stoker. In fact, the automatic stoker appears to appeal mainly as a general idea rather than because any of its particular features have been impressed on the consciousness of the domestic consumer. The combined total of replies mentioning convenience, economy and cleanliness—the three principal selling features of the stoker—just about equals the total of replies classified under "habit."

Some striking differences in the attitude of home owners and renters toward stokers are summarized below:

Prefer Stokers Because of:	Owners, Per Cent	Renters, Per Cent
Convenience	6	4
Economy	21	25
Cleanliness	8	12
Heating qualities	2	20
Safety	10	9
Habit	41	25
Miscellaneous	12	5

The home renter is more specific than the owner in his reasons for preferring the stoker. It appears that renters, perhaps because they frequently have an opportunity to choose the type of equipment in the place they are to live and therefore may be more experienced, are more alert to the equipment qualities which will meet their requirements. It is a permissible deduction that the renter has had to find out these qualities for himself. If the home owner was equally or better informed, or opinionated, it might be logical to assume that he, or perhaps both, had been influenced by sales promotion. Lack of appreciation of the merits of the stoker among home owners clearly indicates that sales-promotion efforts, if any, have not stressed the basic selling points of the equipment.

Reasons for the preference for oil, as between home owners and renters, are summarized as follows:

Prefer Oil Because of:	Owners, Per Cent	Renters, Per Cent
Convenience	40	45
Economy	17	13
Cleanliness	21	24
Heating qualities	15	8
Safety	1	0
Habit	6	8
Miscellaneous	0	2

Obviously, the domestic consumer is much better informed as to why he prefers oil than why he prefers the stoker. Only 6 per cent of the home owners in this group fall in the "habit" classification, compared with 41 per cent of the owners preferring stokers.

As a further check on the consumer's opinion of the relative convenience and economy of the oil burner as compared with the stoker, the following questions were asked:

1. Which is more convenient—a coal stoker or oil burner?
2. Which is more economical—a coal stoker or oil burner?

PUBLIC *for* THE COAL INDUSTRY RELATIONS

The replies are summarized below:

	More Convenient, Per Cent	More Economical, Per Cent
Coal stoker	17	39
Oil burner	49	16
About the same	7	9
Don't know	27	36

In the answers to the above questions there is much food for merchandising thought. If the principal appeal of the coal stoker is economy it is evident that this has not been gotten over to a large percentage of the consumers, as compared with the percentage of consumers that are aware of the principal appeal of the oil burner—convenience. That the stoker is of the same relative convenience as the oil burner is believed by only a comparatively small number—just about equal, in fact, to the number that believe, perhaps erroneously, that the oil burner is more economical than the stoker. The "Don't know" group alone should amply repay intensive cultivation.

To find out how successful dealers and others have been in acquainting the consumer with new developments in coal preparation, the group covered in the survey was asked:

Have you ever heard of "dustless" coal?

To establish a basis of comparison of knowledge of this type of coal, however, persons interviewed were first questioned about a type believed to be widely known, viz:

Have you ever heard of "nut coal?"

Replies to these questions indicate a startling lack of knowledge about dustless coal, as somewhat over half the people interviewed had never heard of it.

	Nut Coal, Per Cent	Dustless Coal, Per Cent
Have heard of	79	44
Never heard of	17	49
Don't know	4	7

Those replying that they had heard of dustless coal were asked where it could be purchased. Of this group, 43 per cent mentioned a specific dealer or said that it could be purchased from any dealer, while 57 per cent had no idea where it could be obtained. Although it is to the advantage and convenience of the consumer to use dustless coal, it is obvious that even of those who know about the product many are not sufficiently aware of its potentialities to know where it can be bought.

How much promotional effort are coal and oil dealers putting forth to sell their products to the consumer? Although some approach their customers, actual and prospective, by mail, telephone and in person, replies to the following question do not indicate that campaigns are, in general, systematic:

Does your coal (or oil) dealer ever send you advertising, telephone you or call on you?

	Coal Dealers, Per Cent	Oil Dealers, Per Cent
Send advertising	44	25
Telephone	7	7
Call	9	22
No approach	51	48

Note: These columns add to more than 100 per cent because a number of persons interviewed replied under more than one heading.

It is evident that oil dealers check up from time to time on their customers' fuel supply and consequently they are rated as making a much higher proportion of calls. The fact that nearly half of all consumers are conscious of no promotional effort whatsoever indicates the possibilities for effective work in both fields. Replies to a question as to the number of times in the past three months the fuel dealer either called, telephoned or sent advertising shows that coal dealers who send advertising do so about every 75 days, while oil dealers do so about every 56 days. Coal dealers

telephone on an average every three months, while oil dealers telephone about once a year. Both coal and oil dealers who call personally, in addition to filling bin or fuel tank, do so about once a year.

The relative permanency of customer-dealer relationships is another pertinent factor in coal merchandising. Two questions were asked on this subject:

1. How long have you used your present type of fuel?

2. How long have you been buying fuel from your present dealer?

Of the coal consumers, 45 per cent have purchased from the same dealer during the entire period they have been buying that fuel, while 75 per cent of the oil users have been buying from the same dealer throughout. However, there are more coal than oil dealers, so coal consumers have a greater opportunity to change. Moreover, a large proportion of the people who use coal rent their homes and consequently move more frequently, which occasionally necessitates a dealer change. Finally, since coal has been in use as a fuel longer than oil, people have had a longer time to change coal dealers, as compared with oil merchandisers. To eliminate this last factor, averages were based only on those people who had been using coal nine years or less, a period comparable to the general use of fuel oil. By this method it was found that coal had been used for 3.8 years but that these customers had been buying from their present dealers only 2.7 years, or 71 per cent of the time. Comparable figures for oil are 3.7 and 2.9 years, or 78 per cent of the time.

Consumer shifts from one dealer to another are illustrated in the following breakdown, showing that coal consumers change oftener than oil consumers:

CUSTOMERS USING FUEL FOR A GIVEN PERIOD OF TIME WHO STILL BUY FROM THE ORIGINAL DEALER

Number Years of Use	Coal, Per Cent	Oil, Per Cent
2 or less	92	91
3 to 4	57	78
5 to 6	44	50
7 or over	29	45

It would appear from this survey that the sales competition of the oil dealer is much less aggressive than some coal men have believed, and that the coal business, particularly through the automatic stoker, has an excellent market waiting to be developed through effective and up-to-date retail merchandising.

CONVEYOR-CONTROL SYSTEM

Provides Convenience and Protection In Operation of Fifth Vein Coal Co. Units

With mother belts receiving coal from room conveyors in turn serving loading machines, the Fifth Vein Coal Co. found a complete control and signaling system a necessity. As finally evolved, the system provides complete protection against accident and also embodies signal lights to show where stop impulses originated

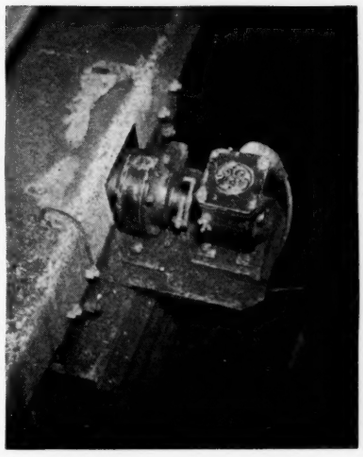
SOMETHING more than merely starting switches has been found a necessity where room-and-mother-conveyor transportation systems have been installed. At the No. 5 mine of the Fifth Vein Coal Co., near Harrisburg, Saline County, Ill., coal is produced by loading machines feeding onto chain-type room conveyors which in turn discharge onto belt-type mother conveyors. Until the end of 1939, these mother belts fed onto temporary main and slope belts which brought the coal to daylight. Starting this year, however, the mine went to cars to move the coal to a rotary dump at the bottom of the main belt slope, and now the mother belts discharge into the mine cars.

When the conveyors arrived they were equipped with only the usual starting equipment, including pushbutton stations. Operation soon indicated, however, the need for an auxiliary control and signaling system not only to enable the men to coordinate the operation of the various units and to ascertain the cause of any trouble but also to protect the equipment itself, particularly the mother belts. Consequently, in consultation with the engineers of the Joy Manufacturing Co., which supplied the conveying and loading equipment, the Fifth Vein electrical and operating departments have installed separate circuits with fused safety switches for control and signaling, developed indicating lights to show when power is on the operating circuits and, if not, whether it was cut off inside or outside; installed emergency stop stations, with accompanying starting buttons, along the belts; equipped belt conveyors with roller switches to stop the driving motor if the belt fails to move or stops for any reason; interlocked controls to shut off the room conveyors in case of a belt stoppage; and installed pushbutton stations on the ends of cables to enable men at the face to start and stop room conveyors without going out to the drive head.

Underground equipment at No. 5 operates on 275 volts d.c. supplied

by motor-generator sets near the load centers. Standard practice is to make these sets automatic on the d.c. side and supplement these controls with sectionalizing breakers for each working territory. On main lines where track is laid, the positive circuit consists of four 4/0 wires with welded rails for the return. In panels, four 4/0 wires are carried up to about No. 30 room, some 1,500 ft., with two 4/0 wires from there to the end. Equal-sized returns are installed. Control circuits, on the other hand, are made up of rubber-covered cables (Nos. 14 and 16 wires) and also operate on 275 volts d.c. Incidentally, much trouble originally was encountered from splices in the control cables pulling apart. This trouble was licked by tying the cable sections together with square knots, leaving the ends hanging for splicing. The knots now take the strain, and the cables are taped on each side to prevent them from pulling through.

Fig. 1 shows how the system is applied to the control of three belt and three chain conveyors. The number of conveyors, of course, can be reduced or indefinitely increased with no change in the wiring plan. Mother belts, as stated above, are equipped with roller switches (General Electric CR2960SY72V). A switch of this



This roller switch opens when the conveyor belt stops and shuts down the driving motor.

type (*B*, Fig. 1) is installed on a bottom roller on each belt, usually near the drive end. The roller switch is accompanied by an auxiliary contactor, *A*, which maintains power on the control circuit for starting until the roller switch closes.

In starting a belt, therefore, the "Start" button at the driving head is pressed, whereupon Contactor *A* provides the starting power. If the belt fails to move, meaning that the roller switch will not close, the condition can be observed by the operator, who can stop the driving motor by removing his finger from the start button. But if everything is correct and the belt starts to move, the roller switch closes and thereafter guards against belt stoppage from any cause, such as a wet belt, overload, breakage, etc. In this event, the roller switch opens, shutting down the motor and, as indicated in Fig. 1, cutting power off everything behind. It also will be noted in Fig. 1 that the control and emergency pushbutton stations for belts in series also are in series, so that belts can start only in sequence. Likewise, the stoppage of one belt cuts off everything behind, including the chain conveyors, inasmuch as power for the chain-conveyor control circuit is taken off the motor lead inside the starting contactor (*5*).

In addition to the regular control station, *D*, at a belt head, any number of emergency pushbutton stations (also Cutler-Hammer 10250H27A) may be installed along the belt in series with the head station. Usually, emergency stations (*E*) are placed about every 500 ft. along the belt. Their position is indicated by a purple light so that they may be found

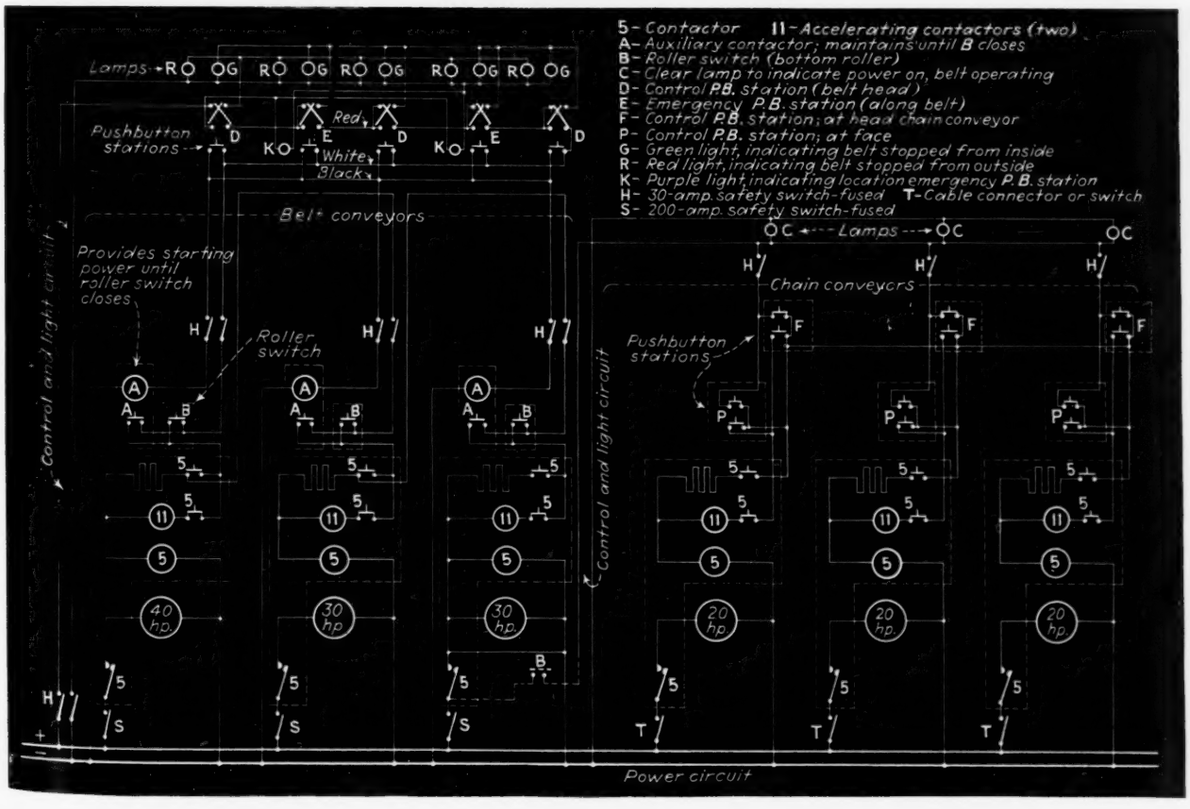


Fig. 1—Conveyor control and signaling circuits as installed at No. 5 mine.

An emergency stop station along a conveyor belt. At the left is the purple light showing the position of the station, while at the right are the red and green signal lights showing where the conveyor was stopped.

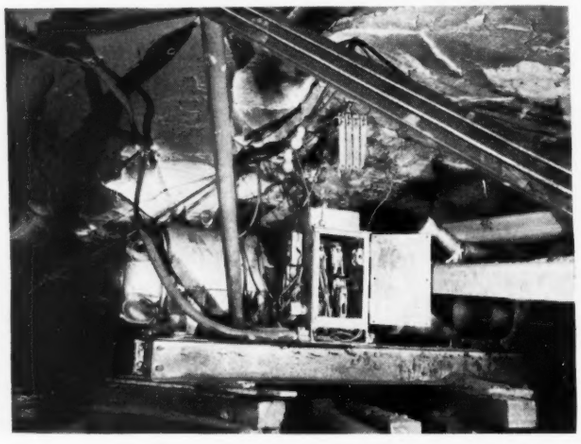
quickly when necessary. And both control and emergency stations normally are accompanied by signal lights to indicate, in case of a stoppage, whether the "Stop" button was pressed at the head of the belt or some point inside. Also, signal lights may be installed at other strategic points, such as the boss' shanty, electrician's shop, etc., as this requires only running the lighting circuit around to these points.

In case the belt is stopped and a green light is showing, any person can tell at once that the conveyor was shut down inside by somebody pressing the "Stop" button in an emergency station which, as indicated in Fig. 1, shuts off the power and lights the green bulbs in the signal circuit. Likewise, men inside and elsewhere, in case of a stoppage of operation, know, when they see a red light, that it resulted from pressing the "Stop" button at the conveyor head, which lights all the red lights in the signal circuit. When the belt is running, neither the green nor red lights burn.

"Start" buttons also are provided in each emergency station, so that when the trouble is remedied the conveyor may be started from that point, provided the "Stop" button has not been pressed at another station. In the latter case, a red light may go on, and the men therefore know that the power was shut off outside. The system also works in the opposite direction: i.e., men completing work at a loading head and encountering a green light know that a "Stop" button has been pressed inside. The signal lights have been found much more advantageous in quickly locating a trouble spot than the telephones formerly used.

Chain conveyors feeding onto a belt conveyor also are provided with a separate control circuit. Ahead of each conveyor head in this circuit is a safety switch, which enables repairmen to cut off all power on a unit when making inspections or repairs. And, as stated above, one side of the chain-conveyor control circuit is taken off the lead to the belt motor, so that when the belt motor is stopped, opening of the contactor shuts off the power on the chain units and prevents flooding of the belt. A clear light is installed at each chain-conveyor drive head and is connected in the control circuit as shown in Fig. 1 to show when the belt is operating, which means that power is available on the chain-conveyor control circuit. This light, of course, can be seen from the working face.

Chain-conveyor drive motors are equipped with two pushbutton-type control stations (Square D 9001–B21–W93), one at the drive itself and another on the end of a cable long enough to reach to the face of a full-depth room. Thus, the pushbutton station always is close to the hand of the loading-machine operator when he moves into a place and gets ready to start the room conveyor. Cable not stretched out to the loading head is wound on a light wooden frame, which is stood up against the rib close to the face. As the face advances, more cable is unwound from the frame.



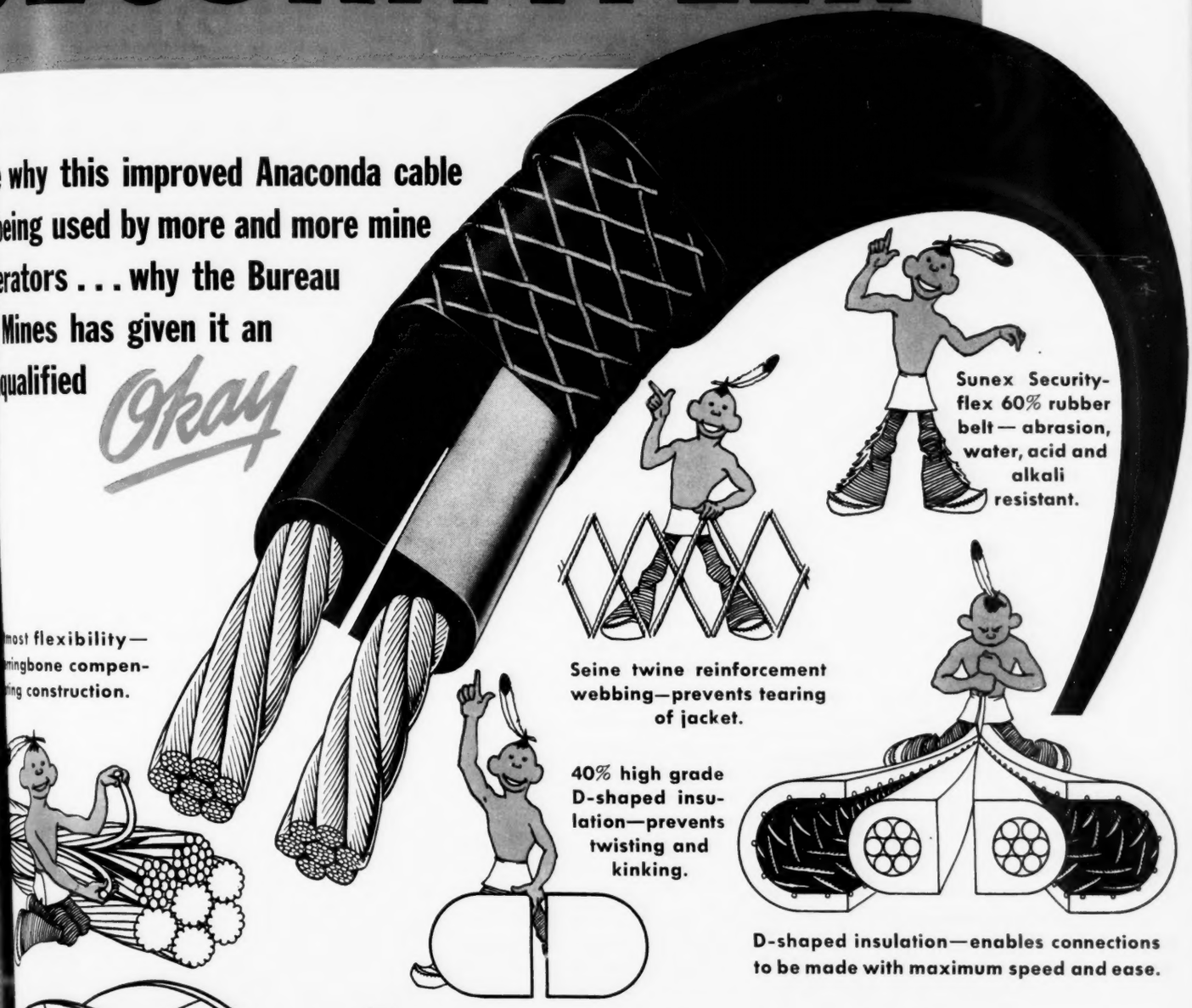
Belt-conveyor drive in No. 5 mine. Controller case has been opened to show contactors. On the side of the case is the pushbutton control station. Above the case are the red and green signal lights to show whether the conveyor was stopped from the inside or the outside.

Chain-conveyor drive head in No. 5 mine. On the side of the controller case is the safety switch for cutting off control current and also the pushbutton control station. The cable in the foreground is the connection to a second pushbutton control station at the face.

A mining cable with no superior—

SUNEX

SECURITYFLEX



ee why this improved Anaconda cable s being used by more and more mine erators . . . why the Bureau f Mines has given it an qualified *Okay*

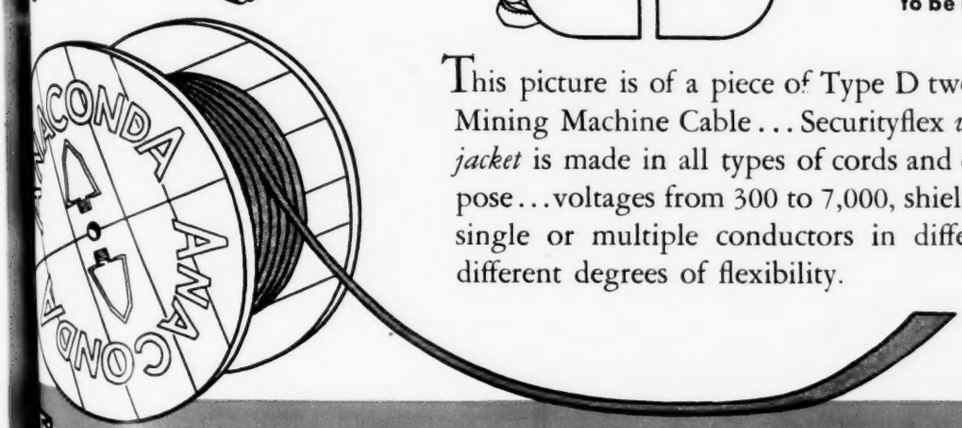
Sunex Securityflex 60% rubber belt — abrasion, water, acid and alkali resistant.

most flexibility— ringbone compen- ing construction.

Seine twine reinforcement webbing—prevents tearing of jacket.

40% high grade D-shaped insulation—prevents twisting and kinking.

D-shaped insulation—enables connections to be made with maximum speed and ease.



This picture is of a piece of Type D two conductor Parallel Mining Machine Cable . . . Securityflex *with the famous Sunex jacket* is made in all types of cords and cables for every purpose . . . voltages from 300 to 7,000, shielded and unshielded, single or multiple conductors in different strandings for different degrees of flexibility.

4-38-9

ANACONDA
from mine to consumer

USE MODERN IMPROVED

Anaconda Wire & Cable

ANACONDA WIRE & CABLE COMPANY, General Offices: 25 Broadway, New York City; Chicago Office: 20 North Wacker Drive

Subsidiary of Anaconda Copper Mining Company. Sales Offices in Principal Cities

WHAT'S NEW ACROSS THE SEA

OXIDATION of aluminum gives intense heat, a principle that is the basis of Thermit welding and flash lighting. Similarly magnesium when oxidized emits much heat. These properties of aluminum and magnesium can be employed in explosives for blasting, declares C. Baron in a communication to the Académie des Sciences. It raises the reaction temperature to 4,480 deg. and reduces the volume of gas evolved, thus giving increased power for use in rock. To protect the powder from the slow oxidizing action of the nitrates, petroleum pitch is added. By adding nitroglycerin or other sensitive nitrogen derivatives, detonation is assured.

TWO FORMULAS FOR ALUMINUM BLASTING POWDER

	Per Cent	
Nitroglycerin	5.00	22.00
Nitrocotton	0.00	0.75
Dinitrotoluene	5.00	3.00
Petroleum pitch	1.50	2.00
Aluminum powder	5.00	2.00
Wood meal	1.50	1.25
Ammonium nitrate	82.00	69.00
	100.00	100.00

Use of these light metals in the manufacture of explosives possibly may be a doubtful expedient because, if the cartridge is thrown out of the borehole incompletely detonated, it might burn fiercely and disastrously, and, in shooting coal, the cartridge, even if properly detonated and retained in the hole, probably would ignite that material. The combustion of these metals in a drillhole in coal would be as hazardous as that of carbon in liquid-oxygen explosives, though the metals are used in relatively small percentage. A most desirable feature in an explosive for use in coal mines is a low-temperature combustion or at least a combustion that will not raise the peripheral temperature of the cartridge unduly. The latter requirement is sometimes attained by the use of an inclosing sheath that lowers the temperature of the escaping gases.

FLOOR which squeezed up between packs in a roadway of the Langwith colliery, in Derbyshire, England, caused an undue weight to rest on the posts alongside these packs. Furthermore, the packs would compress, and the posts, being relatively uncompressible, took some of the weight that should have been taken by them. To meet the difficulty, when such a pack was built, timber was laid crosswise to the roadway, on top of the pack, so that the posts could be set on the ends of these timbers, which, resting on the rock filling, would descend with it and would be supported by it. Thus the posts would be subject only to the weight of the drawslate over the top of the heading.

This method of support, described by the mine inspector for the North Midland Division of Great Britain in his annual report, is not new, as indeed he states, but may be of use to those who have similar trouble. Such trouble may occur in passing through old workings or, in less aggravated form, in gob headings and closely gobbed rooms. The plan serves, however, only where the support desired is temporary. However, after the packs have consolidated, and the load consequently is no longer causing movement, permanent supports resting on the floor will hold up the drawslate.

REFERENCE was made in this department (March, p. 56) to the fear frequently expressed in Great Britain that water, if used for spraying, would cause the floor to heave and thus prove disastrous. Another objection is that, in deep workings such as are found all over Great Britain, spraying would add to the prevailing humidity, which in air already at a high temperature would make working conditions unduly burdensome. But the Holditch colliery, Stoke-on-Trent, Staffordshire, England, had so much trouble with dust in the face, at the gate ends and at the revolving tipples and screens that the nuisance could not be endured, declared John Walker, in addressing the North Staffordshire Institute of Mining Engineers.

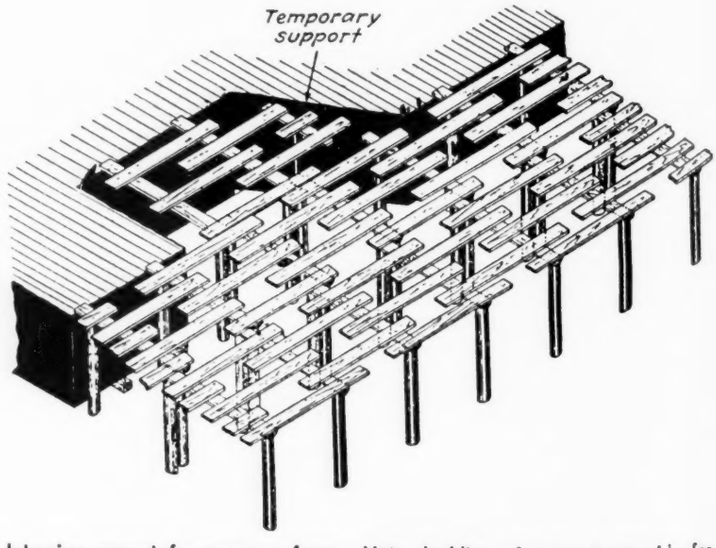
In consequence, after inspections were made of elaborate dust-collecting plants at various collieries, Mr. Walker conceived the idea of allaying the dust by a water mist on the screens around the tipple until seven separate points were thus protected. The first attack underground was made at loading points. At first a round spray was used, and later a flat spray giving a mist as wide as the belt. The next dust-raising point tackled was that where two face belts discharged onto a mother belt, and when that proved effective, he tried the sprays on a top-cutting machine.

As the Four-Foot seam varies in thickness from 4 ft. 8 in. to 5 ft. 2 in., the bug-dust has to fall 4 ft. to the floor. The coal is a household and coking coal of high quality, the floor is very hard and the roof weak. All the bug-dust from the 4-ft. 8-in. cut is of 1 in. or less, and about 11 per cent of it will pass through a 60-mesh screen.

Back of the machine is installed a 40-gal. tank which suffices for cutting 240 ft. of face. The water used, which comes from the mine, is subjected to an air pressure of 2 lb. per square inch, by which it is lifted to the level desired. Though the sprays were used in places as much as 4,200 ft. below the surface, not enough humidity resulted to affect the mine workers adversely.

Of course, after a long time, the effect of spraying may possibly become injurious. As to the duration of the test, nothing appears to have been said at the meeting. Perhaps, after all, the fears entertained by many British engineers are not wholly justified. Certainly, it would seem better to use the water at the exact point at which the coal is broken into fine particles rather than at any other place and to use it also at a location which changes every hour and thus where the spray will have, it might be hoped, only a purely superficial effect on the strata. To spray at so permanent a point as the gatehead might be more productive of trouble.

ONLY 35.5 per cent of the accidents which occurred in the Midland and Southern Division of Great Britain, declares E. Rowley, the divisional inspector, in his annual report for 1938, were purely accidental, but 30 per cent could have been prevented by altering the system of work or the method of operation, and



Intensive support for conveyor faces. Note doubling of props to provide for forward and rear crossbars.

28.3 per cent by improving the timbering systems, leaving 6.2 per cent that could have been eliminated by using different tools. Use of the correct tool for certain operations is largely a matter of training, he adds; year after year accidents occur because a pick is used for a pinch bar, or a hammer instead of a Sylvester for prop withdrawal.

AIR so clear of dust as to be invisible may develop silicosis in those who breathe it, declared C. S. Chubb and T. A. J. Braithwaite of the Mining Department of University College, South Wales and Monmouthshire, Cardiff, Wales, in a paper read before the South Wales Branch of the National Association of Colliery Managers.

A dust cloud made up of 450 particles per centimeter of sizes less than 10 microns is invisible, yet it is dangerous. Some authorities believe that dust larger than 12 microns is not dangerous and others declare that 7 microns is the limit. Whether there is a lower limit of size below which silica dust will cease to affect the lungs is not known, but general opinion now appears to accept 10 microns as the upper limit.

Tests made to ascertain the danger that men traveling along a rock-dusted heading may stir up enough dust to develop silicosis have shown that, if all the dust were free silica, it would not have a concentration such as would be dangerous, according to the standards of hazard as laid down by the South African Silicosis Conference. Seeing that the dust raised is not all rock dust and not all the rock dust is silica dust and that the men are exposed to the dust only a short time, danger of developing silicosis from this source is inconceivable.

Stress is laid on drilling and in a lesser degree on shoveling dust. Where possible, highly silicotic material should not be deliberately used for stowing, and wherever such material must be used it should be wetted before use or the men supplied with a respirator or some investigations made to determine the hazard, asserted the authors of the paper.

R. Dawson Hall

WHAT'S NEW ON THE BOOK SHELF

Requests for U. S. Bureau of Mines publications should be sent to Superintendent of Documents, Government Printing Office, Washington, D. C., accompanied by cash or money order; stamps and personal checks not accepted. Where no price is appended in the notice of a publication of the U. S. Bureau of Mines, application should be directed to that Bureau. Orders for other books and pamphlets reviewed in this department should be addressed to the individual publishers, as shown, whose name and address in each case are in the review notice.

Possibilities of Research in the Gasification of Coal, by C. A. Barnes, Bituminous Coal Research. Technical Report No. V; 35 pp.; paper. Price, 15c.

In this booklet, Dr. Barnes, of the Battelle Memorial Institute, records his studies into the justification for conducting research regarding the gasification of coal. Seeing that, in general, gas manufactured from coal, as he admits, cannot now compete on a cost per unit of heat with either coal or natural gas and that the use of manufactured gas in preference to oil or solid fuels now depends in every case upon its superior qualities of convenience, cleanliness and specific adaptability for certain purposes, cannot a bigger market be found for gas if it can be made at a lower cost?

Research effort profitably might be expended, declares the author, (1) on the preparation of gaseous enrichers either (a) using coal as a source of raw material for water gas which has as essential constituents carbon monoxide and hydrogen, these being used directly for the formation of methane, or (b) producing methane by hydrogenation of coal or coke; (2) complete gasification of coal with production of water gas of a low heat value, using a continuous process embodying the passing of pulverized coal through tubes at high temperatures, using alloys that will withstand such condition; (3) complete gasification of coal with production of high B.t.u. gas, using high-pressure hydrogenation of coal and coke as above suggested, or gasification with oxygen under pressure, instead of air, but this would involve an oxygen-separation plant as well as one for gasification; (4) carbonization of coal under pressure to produce a more reactive coke and a gas of high heat value for use as an enricher for water gas.

Problems outlined in the report of a survey or educational nature are:

How to increase the use of bituminous coal as generator fuel in water-gas sets to supplement or supplant anthracite which is now being used in 75 per cent of the cases; (2) what is the possibility of distributing gas of lower heat value than is now customary? and (3) how to increase the sale of coke, a project which might be possible because coke burns with greater efficiency and less smoke than bituminous coal.

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Sulphur in the Products of Combustion of Fuels, by L. R. Burdick and J. F. Barkley, U. S. Bureau of Mines. I. C. 7065; 23 pp.; mimeograph.

A short ton of coal with 2½ per cent of sulphur will put 9 gal. of concentrated sulphuric acid in the air if, in combustion, 90 per cent of its sulphur combines with oxygen to form gases. H. F. Johnstone has found that, with a chain-grate stoker, the flue gases of the second pass of the boiler contain 93 per cent of the sulphur originally present in the coal. In the Federal Central Heating Plant, Washington, D. C., an average of 97.5 per cent of the sulphur in the coal was found in the flue gases.

Trivanov and Trivanov showed that of the substances chosen for test, lime, limestone and dolomite in the order named threw the most sulphur to the ash when mixed with the coal. Lime gave the best results of any. Barium compounds were not tried. With 10 per cent of lime in the coal, 94 per cent of the sulphur is left in the ash if (1) the combustion temperature is 900 deg. C. and (2) the coal contains a beggarly 1.1 per cent of organic sulphur and a mere trace of inorganic sulphur. But, to the reviewer, this kind of treatment would appear hopeless. Who would want to add 10, 20 or 30 per cent of inert matter to coal, presuming that under the circumstances he could burn the dirty mess?

This information circular, as that designation suggests, merely records what has appeared in the literature on this subject.

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Applied Economics for Engineers, by Bernard Lester, Westinghouse Electric & Manufacturing Co.; member American Institute of Electrical Engineers; lecturer, University of Pittsburgh. John Wiley & Sons. 455 pp., 6x9 in.; cloth. Price, $4.

This book is an introduction to the practical aspects of economics, based upon conditions and problems encountered in engineering practice. It offers an understanding of the economic principles and the application of these principles in the many branches of technology. Points seldom touched upon in college studies are made known, the engineer finding that he encounters people in addition to things and that failure or success of economic units usually hinges upon capable management. Included is a review of the principles of engineering reports and planning, showing the connection with the economic set-up.

Forms and types of industrial organizations are described and how every major policy or project adopted by an industrial company requires study, not only from the economic viewpoint but also in regard to the effect that will be created in the minds of all whom the company in the slightest degree attempts to serve. The principal elements of cost (effect of costs and volume on profits, depreciation calculations) and statistical and accounting methods (business ratios, budgets) are covered. Markets, distributions of technical products, organized selling and price policies are described. "The Engineer as a Citizen" is an intelligent, valuable discussion. The last chapter is a practical application of the problems presented as applied to industry. Included are studies on mechanical loading in coal mining, air conditioning, purchased power vs. private generation and many others.

Most of the subjects should be of value to those concerned with the operation of industry; not only to engineers. It reads easily and the practical viewpoint holds the interest. The operating personnel of coal mines can find a great deal of food for thought, especially in chapters such as that Lester entitles "Human and Public Relations in Industry." If the principles expressed in this book were expounded in a series of weekly lectures by a company executive to the operating personnel, more efficient operation should result.—C. H. L.

WHAT'S NEW IN OPERATING IDEAS

Plant Efficiency Improved By Trimming Platforms

Due to the several disadvantages of attempting to trim lumps on the picking tables, special trimming platforms have been built on each side of the run-of-mine screen and picking tables in the new Mine No. 1 preparation plant of the Island Creek Coal Co., Holden, W. Va. Lumps that require trimming to remove slate or bone are pushed over onto the trimming platform and left there until the plant is stopped for want of coal or other reason and then the pickers mount the platform and do the trimming.

These platforms are designated by *A* and *B* in the illustration. Platform *A* is completely to one side of the Marcus screening and picking unit but Platform *B* is built above a section of the Marcus unit used for classifying and dewatering washed coal.

The Marcus, a No. 10 driven by a 50-hp. motor, is of extreme size. The raw-coal screens and picking tables are 6½ ft. wide and have an over-all length of 65 ft. Width of the classifying and dewatering screen also is 6½ ft. and the over-all length is 85 ft. Between the run-of-mine screens and the classifying screens there is a space of 5 ft. to allow the pickers on one side to stand. Thus the total width of the Marcus unit is 18 ft.

Inasmuch as the coal is mechanically loaded, some large pieces of slate appear at times on the picking tables. Any of these too large to pass through the refuse-chute grilles designed to limit size for proper handling by the refuse conveyor also are pushed onto the trimming platforms for later attention.

Platforms are constructed of concrete supported by 40-lb. rails spaced on 12-in. centers. The rails extend ¾ in. above the concrete and thus offer smooth ways for sliding the lumps. Among the several advantages of the trimming platforms is the all-important one that the pickers are not called upon to neglect their primary duties of picking slate from the lump coal passing over the tables.

•

Reason for Stopping Tipple Proclaimed by Signals

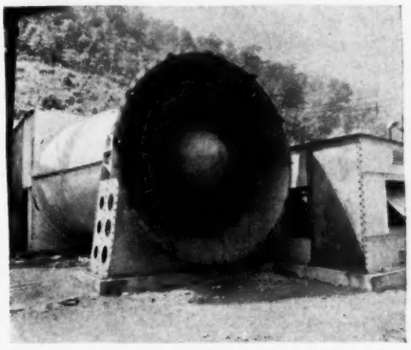
When the tipple and cleaning plant at Mine No. 1, Island Creek Coal Co., Holden, W. Va., is stopped at any time during a shift one of three lamps, white, green and red, is lighted to proclaim the reason. These signal lamps can be seen plainly from the superintendent's office and from the tipple and cleaning plant. If the stop order originates at the tipple, the white lamp is lighted; if the slope bottom is out of coal or blocked off with empties, the green lamp is lighted; and if the cause is a breakdown or other trouble on the bottom, the red is lighted. Coal is brought up the slope by a belt conveyor and the lamp signals are controlled by the dumper at the bottom.

"A" and "B" are the trimming platforms which have been built on each side of the picking section of the 18x85-ft. screening and picking unit.

Synchronous-Motor Fan Drive Is New "Package" Unit

The "package-type" synchronous motor made its debut as a drive for coal-mine fans in May and the initial installation consists of a 200-hp. 900-r.p.m. 80-per-cent-power-factor unit installed at Mine No. 21 of the Island Creek Coal Co., Holden, W. Va., to replace a 60-hp. induction motor. Auxiliaries consisting of the exciter and a "frequency-responsive" automatic starter are mounted on top of the motor so that the whole unit takes little more floor space than the induction motor it replaced. The original motor operated on 440 volts, which, with but few exceptions, is the voltage used by the company for all outside equipment. Therefore, the new motor was specified for that voltage.

Need to speed up the size 8-111 Aerodyne fan for increasing mine ventilation was the reason for considering a new motor. It was determined that at least 100 hp. should be provided, and the coal company had no motor of that capacity available. Although 3,000 kva. of capacitors had been installed

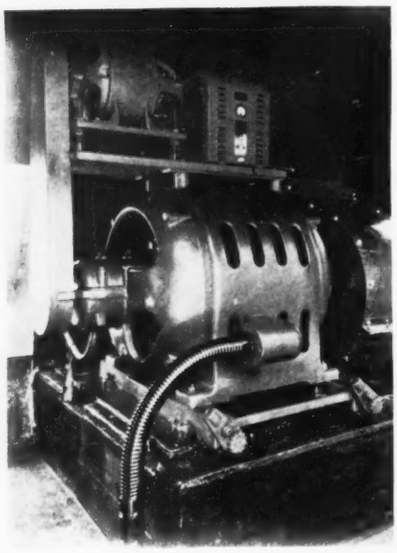


The new "package-type" synchronous motor drives this modern mine fan.

at the plants during the last decade, a survey showed need for still more power-factor correction. Installation of a 100-hp. induction motor would have called for more capacitors. As an alternative the 200-hp. synchronous motor, having extra current capacity for 100 hp. of correction and capable of being adjusted to meet later correction demands if necessary, was considered a better proposition.

Maximum rated speed of the fan is 860 r.p.m. and at present it is being driven at 650 r.p.m. through the medium of nine V belts operating over a 13-in. sheave on the motor and an 18-in. sheave on the fan. The motor input is 88½ hp. and the shaft horsepower as calculated from the rated efficiency of the motor is 79.5.

The "frequency-responsive" automatic



Exciter and "frequency-responsive" starter are mounted on top of the motor.

starter which is a part of the package unit includes a field ammeter, polarized field frequency relay, field rheostat, magnetic contactor and field discharge resistance. At starting, the exciter armature is disconnected from the synchronous field and the field short-circuited through an a.c. relay coil in series with the field-discharge resistance. As the speed increases and the frequency of the induced field and its voltage changes, a balance point is reached in the relay between the a.c. coil and another coil connected across the exciter. It is asserted that this method invariably brings about excitation of the synchronous field at the correct time. This synchronous motor with its self-carried auxiliaries was built by the Electric Machinery Manufacturing Co., of Minneapolis.

•

Neck Guards on Hard Hats Protect From Trolley

Chances of electric shock to machine operators as a result of striking a trolley wire with neck or ears has been eliminated in Island Creek No. 7 mine, Holden, W. Va., by a neck guard which is the culmination of ideas worked out by William Crawford, superintendent, and A. J. Bartlett, safety engineer.

In the illustrations showing a man wearing the guard it can be seen that the guard consists of a rubber "apron" attached to the hard hat by glove fasteners. The band carrying the fasteners is 17½ in. long and the back drop is 11 in. wide by 11 in. total length from the band. Rubber thickness is $\frac{3}{32}$ in.

Includes protection for the ears.

The back of the neck is thoroughly protected.

Workmen appreciate the fact that the protection afforded by the guards outweighs a slight disadvantage in comfort and have taken kindly to their use. Trolley-wire voltage in No. 7 mine is 550. The guards were made up especially for Island Creek by the Mine Safety Appliances Co.

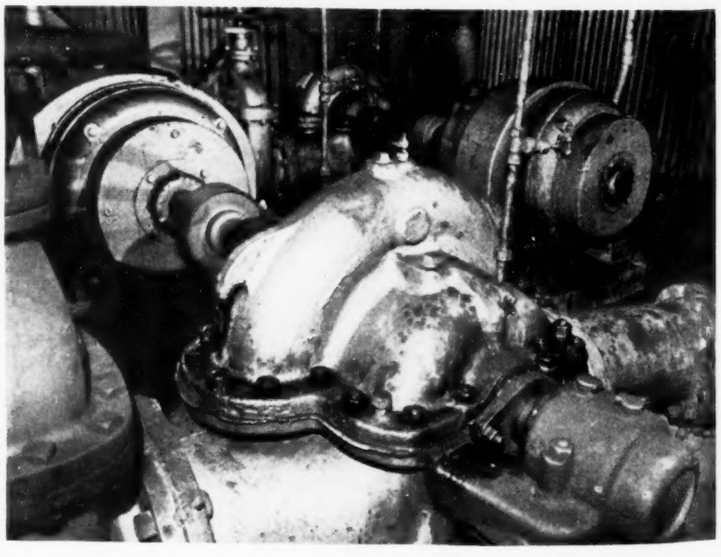
•

Brazing by Arc-weld Process Best on Cast-Iron Pumps

Electric brazing solved a problem in maintenance of the cast-iron shells of washer pumps at Mine No. 14, Island Creek Coal Co., Holden, W. Va. Worn places now are built up by arc-welding, using "Airco" No. 70 heavily green coated $\frac{3}{16}$-in. rod. The material thus deposited wears better than the original cast iron. Gas welding and several types of filler rods were first tried. There is insufficient room in the casing to use a torch to advantage but with long rods any point can be reached by the electric process.

Two of the pumps, each rated at 3,500 g.p.m., handle water from a sump to cone-type settling tanks in a Link-Belt air-pulsated-jig washing plant. The water contains a large quantity of minus 48-mesh material, which wears the pumps rapidly. The electric brazing is done at the washing plant by men detailed from the central shop.

Two 3,500-g.p.m. pumps with repaired cast-iron cases.



Pioneers

"Pioneer Island Creek Coal" means "Heat With Economy" wherever this premium fuel is sold. Back of this product and assuring its quality and low cost, however, is much pioneering by the Island Creek Coal Co.'s operating, preparation, electrical, mechanical and safety departments. Recognizing this original work, Coal Age this month turns over its Operating Ideas section to the Island Creek organization. Next month and the months after, however, we again will be in the market for your ideas for cutting costs and promoting safety and efficiency. So send them in, with a sketch or photo if it will help to make them clearer. For each acceptable idea, Coal Age will pay $5 or more on publication.

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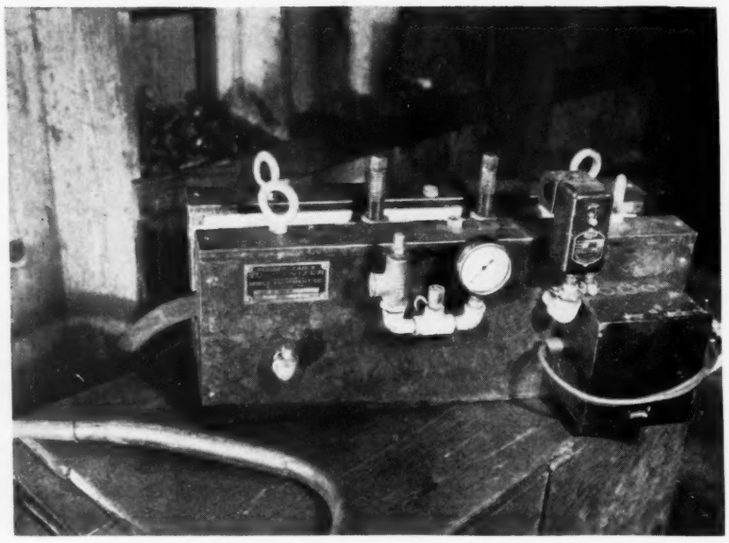
For Safety and Lower Cost Island Creek Vulcanizes

To provide safer working conditions, the Island Creek Coal Co. is adopting vulcanizing for permanent repair of trailing cables. At the time of this writing, three of the mines (Nos. 7, 20 and 22) had been equipped with vulcanizers. The secondary

And a most opportune time, too, for you to start the ball rolling on those new tipple replacements you've been postponing too long.

No matter what you may have under consideration,—a brand new tipple structure, a new loading boom or shaker screen,—perhaps just a minor replacement here or there,—regardless,—drop in at the Morrow Exhibit—Booths 611-13 at Cincinnati and talk it over with one of our engineers. We'll guarantee you'll feel it was time *profitably* spent.

MORROW
MANUFACTURING CO. WELLSTON, OHIO
DESIGNERS AND BUILDERS OF COAL HANDLING EQUIPMENT FOR OVER 25 YEARS



A vulcanized joint makes the cable as safe as new.

advantage, a reduction in delays, is proving worth while in itself. It is expected that with joints properly made the cables will last longer.

The illustration, made at No. 7 mine, shows a No. 2 parallel-duplex loading-machine cable in the vulcanizer, and in front on the bench a splice that has been cured. For each type of equipment a spare cable is kept in readiness for a change when one in service has accumulated three to five temporary unvulcanized splices. The vulcanizer, a Mines Equipment Co. size No. 2 steam-type unit operating at 62 to 68 lb., is installed in the shop on the mine bottom. It operates on 440 volts a.c. and takes 2,000 watts. Face equipment in No. 7 mine operates on 550 volts d.c. and the men have to handle the cables because the loading machines are without reels. Those factors were instrumental in bringing about the adoption of vulcanizing.

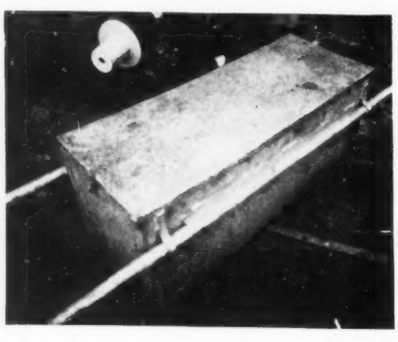
•

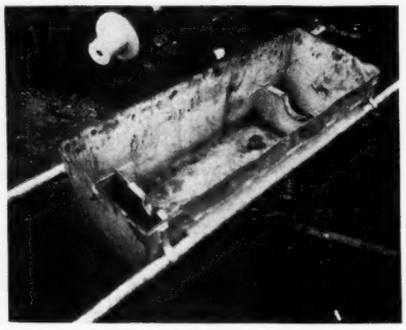
Steel-Armature Shipping Box Replaces Wooden Box

Steel boxes are being built to replace the wooden boxes formerly used by the Island Creek Coal Co. to ship armatures to and from the mines and the central shop at Holden, W. Va. Wooden boxes have proved too weak for the duty. Bulkiness and weight mount to unwieldy proportions when an attempt is made to build lasting boxes of wood. This change in material conforms with a new practice of the company which calls for eliminating wood construction wherever practicable.

As indicated in the illustrations, the boxes are made of sheet steel braced and reinforced on the inside to suit the weight of armature carried. Steel $\frac{1}{16}$ in. thick is used for most of the boxes. Handles are made of pipe and the flanged cover is without hinges but has hasps at each end. Largest armatures handled in boxes are the spares for 75-hp. pump motors, which weigh 1,200 lb.

Lighter, less bulky and more durable than wood.





Welded construction and reinforcing on the inside suit the weight of armature for which the box is intended.

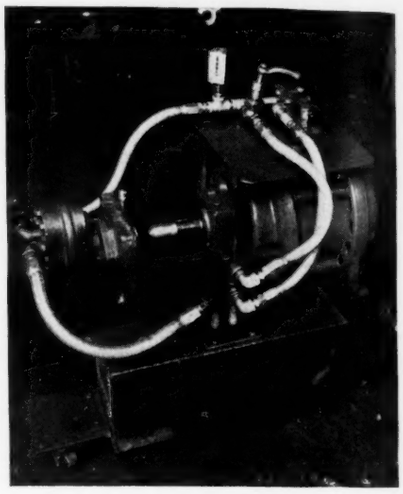
Locomotive armatures are not handled in boxes because they are protected to some extent by the bearing housings which, with bearings, always are assembled on the armatures at the central shop. Total number of armatures now on the spare list for the d.c. machinery at Island Creek mines is 250.

•

Hydraulic Pump Tester Built As a Low Portable Unit

Portability is a feature of a self-contained motor-driven 11BU hydraulic-pump tester used in the central shop of the Island Creek Coal Co., Holden, W. Va. The outfit is on 2½-in. casters so it can be moved any place in the room to change floor arrangement to suit special work or material that may be in the shop.

The tester, complete with 15-hp. 900-r.p.m. 440-volt motor, is 21 in. wide, 39 in. long and 32 in. high. The bottom consists of a $\frac{3}{8}$-in. plate, with a piece of $\frac{3}{4}$x15-in. channel to one side, as a base for the motor and for the pedestal to which the pump is bolted for test. Oil-tank capacity is 6 gal., and, as indicated in the illustration, the gage, control valve and relief valve are mounted above the motor. Drive coupling to the pump is effected by a special male fitting with fixed key which is permanently attached to the motor shaft.



Pump tester in use at Holden shop.

Standard practice in testing a rebuilt pump is to run it one to two hours circulating oil without back pressure and then close the bypass valve to work the pump against the relief valve, which is set at 1,500 lb.

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Special-Shaped Treating Hood Trims Cars to Perfection

Tops of cars loaded on the nut-slack track at No. 7 mine preparation plant, Island Creek Coal Co., Holden, W. Va., appear to have been "landscaped" to engineering accuracy. This excellent appearance results from the use of a hood which accommodates the dustless-treatment sprays but which was shaped to impart the desired contour to the car loading.

To obtain the results indicated in the illus-

Trimmed to a striking exactness.

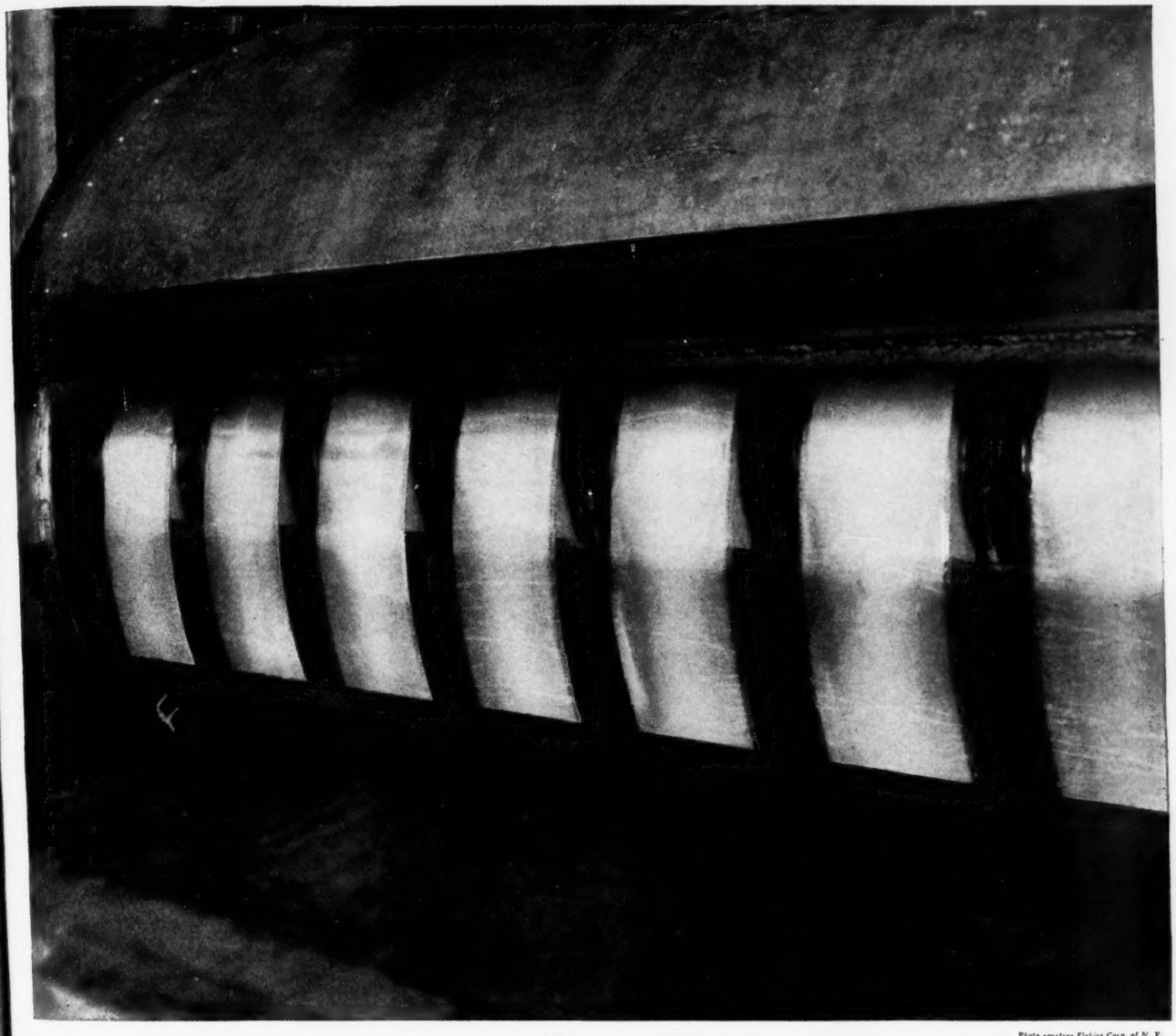


Photo courtesy Flakice Corp. of N. Y.

Ice by the yard from ribbons on rubber

A typical example of Goodrich development in rubber

IN restaurants, dairies (maybe even in mint juleps!) you've seen ice flakes made from thin ribbons of ice. Rubber makes them possible.

A manufacturer came to Goodrich with an idea for an ice-making machine — a revolving cylinder of thin metal, over which water flows. The metal is chilled, the water freezes, and peels off at the top as a ribbon of ice.

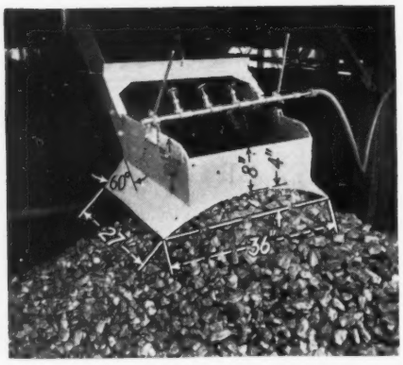
But the inventor wanted the ice ribbons narrow to make them commercially useful. So the metal cylinder was cut into strips separated by rubber. Goodrich already had a method of attaching rubber to metal, and developed a rubber to stand the freezing brine inside, intense cold outside, and tough enough to carry the metal strips indefinitely without wear. The machine was an immediate success; hundreds have been sold to turn out ice for scores of uses — ice that because of its special shape and texture stays cold longer and serves users better.

Goodrich engineers are working every day with manufacturers, on problems like this. Rubber, in the hands of Goodrich engineers, is one of the most versatile materials known. It can be made to flex indefinitely, resist heat and chemicals and air, withstand severe abrasion, and perform what, a few years ago, would have been considered miracles. All these improvements are applied to all Goodrich products. Therefore, to be sure you are getting the latest developments in belting, hose, packing or any rubber goods, specify *Goodrich* to your Distributor. The B. F. Goodrich Company, Mechanical Rubber Goods Division, Akron, Ohio.

Goodrich

ALL *products problems* IN RUBBER

(Another story of Goodrich Development appears on page 1)



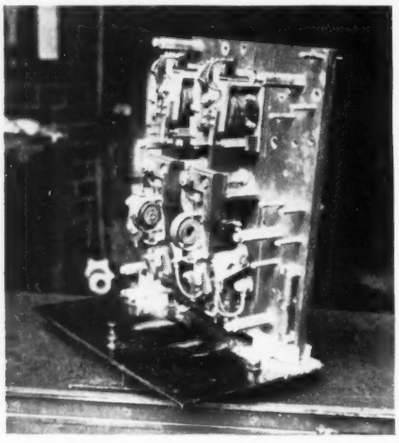
The hood serves also for treating.

trations, the car trimmer needs only to drop the car under proper control as it is loaded and to exercise some attention when filling up the end corners. The hood is built of ⅛-in. steel and the dimensions at the bottom of the flare are 27x36 in.

•

Quicker, Safer and Better Job By Using a Panel Holder

Time is saved and the chance of damage to workmen's fingers and equipment is minimized by a special tool used in the Holden (W. Va.) shop of the Island Creek Coal Co.



The turntable lock is near the front edge of the top plate.

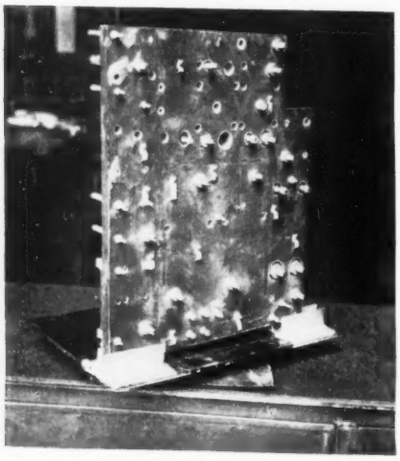


Table turned to present back of panel.

to hold the automatic panels of 11BU loading machines during reconditioning and testing. The tool holds the panel upright and allows it to be turned to any convenient position for working on front or back. The illustrations show a panel in two positions on a workman's bench.

The plate to which the panel is clamped by pairs of angles and two capscrews is ¼x13x20 in. It is fastened to a ¾x13x13-in. baseplate by ball bearings, so is a free-running turntable. A spring catch on the top plate engages depressions in the bottom plate to lock the table in any one of six positions. The panel weight is centered above the bottom plate and therefore the panel is not easily tipped.

•

Signal to Hoist Each Skip Given by Hopper Switch

Only when coal is lacking on the bottom does anyone bell the operator of the skip hoist at Island Creek No. 22 mine, Holden, W. Va. And at no time while coal is available is the feeder to the prepara-

The hopper beneath is full. When it empties to a certain extent, the tie bar across the bolts will drop and operate the limit switch to darken the signal lamps in the hoist house.

tion plant underloaded. Thus, surges and their detrimental effects on washing performance are eliminated. An automatic signaling device installed in the dump bin informs the engineer when to hoist each skip.

A vane normally hanging vertical in the dump hopper (see illustrations) is pushed up by the coal when the hopper is full and this action operates a limit switch, the contacts of which are normally closed. Each side of the hopper has its vane and limit switch and the two switches are connected in series to control signal lamps in the hoist house. The lamps, connected in parallel, are lighted when the hoppers are full and go out when the coal in either side drops to a level which leaves room for another skipload. This darkening of the lamps is the signal for the operator to begin a hoist. In addition to eliminating surges this method reduces the human element in the hoist control. Using two lamps in parallel guards against the operator mistaking the burning out of a lamp for a signal to hoist, because the good lamp will continue to burn.

•

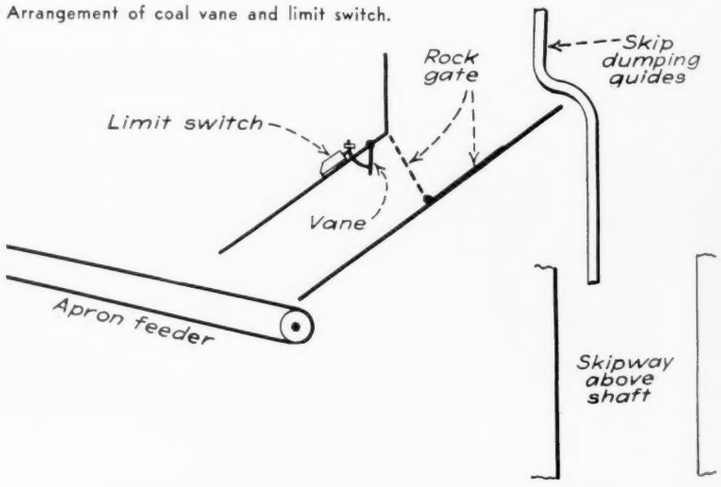
Supply Hoist Rope Difficulty Solved by Hinged Sheave

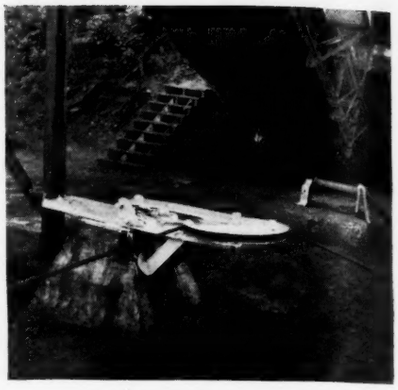
Building a folding sheave with a side-opening frame to replace a snatch block anchored by a chain overcame a condition which had been responsible for excessive wear on a ¾-in. wire rope on the material slope at Mine No. 7, Island Creek Coal Co., Holden, W. Va. The hoist is on the surface in line with the slope track. This track (see illustrations) curves out into the yard at the slope portal and descends slightly from a knuckle near the portal.

Originally, a snatch block was anchored by a chain around the pier of a roller in front of the portal. To pull cars from the yard up to the knuckle, the rope was run through the snatch block, but, because it was practically on the ground, the rope dragged heavily on the rails for some distance along the curve. The problem was to provide a snatch block 2 ft. higher than the rail but arranged so that it would be out of the way of the rope when handling cars on the slope track.

The new sheave is 24 in. in diameter and its frame folds back so that it is completely out of the way of the rope. The top strap, with a hole in the end to slip over the axle, hinges separately for removal of the rope. This slope is 90 ft. long and also in it, to the left of the supply track, is the run-of-mine

Arrangement of coal vane and limit switch.





Pulling cars from the supply yard to the slope portal. A hinged top strap can be raised to remove the rope.

Sheave thrown back, leaving clearance for the rope when dropping cars down the slope.

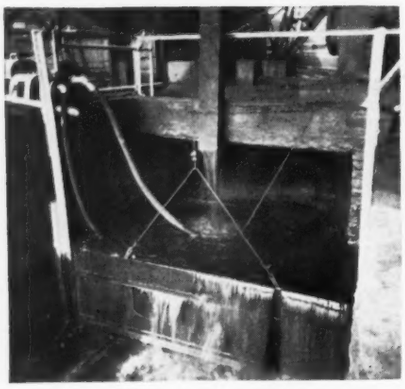
conveyor. Trips of three to ten cars loaded with timber and other supplies are pulled from the yard to the knuckle, but only two cars at a time are handled on the slope.

•

Movable Dam Under Tipple Saves Time and Expense

Installing a movable steel dam in the creek at No. 7 preparation plant, Island Creek Coal Co., Holden, W. Va., has saved the expense formerly incurred in renewing wooden dams after floods and also has made the sump self-cleaning. Deep-well water stored in a 50,000-gal. high tank forms the principal supply for the washing plant. The creek, which flows through a culvert under the plant, is depended upon for emergency supply and this

Low-water view. During high water the steel gate is lifted with a hoist.



The gate dams the creek to retain water in a sump, part of which is in a culvert under the paint.

water is retained by a dam at the downstream end of the culvert.

When a stationary dam was used it sometimes would be torn out repeatedly in a few months and if not torn out it would collect rubbish which had to be cleared out of the sump by hand. When high water comes the new steel dam is raised, thus giving the water free passage and permitting it to clean out any accumulation of rubbish or mud. Close by the dam is a hoist normally used for handling supplies in the mine slope and this hoist is used for lifting the gate. Dimensions of the steel gate are 4½x13 ft.

•

Flight-Straightening Tool An Aid to Maintenance

Preparation-plant maintenance at the Island Creek mines, Holden, W. Va., has been facilitated by building special tools for straightening conveyor flights. The illustration shows one of these tools being used to

A perfect grip on the flight and plenty of leverage.

put back into line one section of a flight of a three-compartment conveyor in the No. 7 plant. Former methods involving hammers, pinch bars and whatnots required more time, were less safe and were not as accurate.

To a handle consisting of a 34-in. length of 2-in. double-strength pipe are welded four ¾x2½x2½-in. angles 20 in. long, notched out 4 in. at the top to receive the handle. The two angles on each side are riveted back to back and the pairs thus formed are spaced to leave a slot ⅞ in. wide. Slot depth is 16 in., but in this case 10 in. is the maximum required; hence cross bolts are placed 10 in. from the bottom. Over-all length of the tool is 50 in.

•

Steel Bench and Tool Cabinet Built as Portable Unit

New individual steel work benches in the electrical department at the Holden (W. Va.) shop of the Island Creek Coal Co. have the following advantages over the former long, stationary wood benches with tool cabinets beneath: (1) fireproof construction, (2)

Convenient access to tools and doors that slide in out of the way.

easy movement to any point in the room for best light and convenience, (3) elimination of the tendency for dirt to accumulate back of benches where it is difficult to clean and

With the three doors closed, all drawers and compartments can be locked.

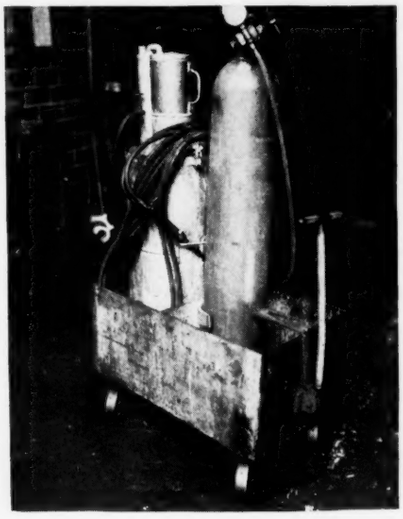
(4) disappearing cabinet doors, doing away with interference experienced with side-hinged doors. Six of the cabinets had been built at this writing and several more were planned to facilitate the work of electrical-shop maintenance men.

Top bench dimensions are 20x40 in. and the working-surface height is 37 in. above the floor. The top consists of ¼-in. linoleum cemented to sheet steel. Casters have 3-in. wheels and ball-bearing swivels. Materials consist of $\frac{1}{16}$-in. sheet steel and $\frac{1}{8}$-in. angles, and the entire job is arc-welded. The two horizontal doors and one vertical door are of the bookcase type and are fitted with high-grade locks worked by one key. With drawers of three sizes, an open compartment at the bottom and a long vertical compartment at the right, ample space is provided for the worker's personal tools and small supplies.

•

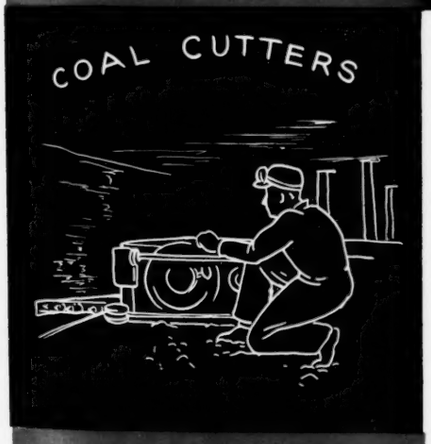
Acetylene-Gas Welding Truck Has Special Advantages

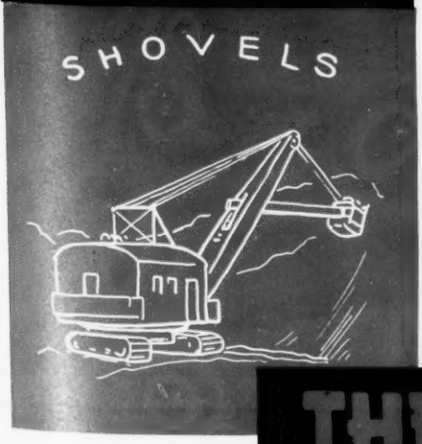
Workmen in the central shop of the Island Creek Coal Co., Holden, W. Va., express enthusiasm over the convenience afforded by a new shop-built truck for carrying the acetylene generator, oxygen tank and accessories for cutting, miscellaneous heating, brazing and gas welding. Casters instead of wheels reduced height, simplified construction and lessened chances of upsetting.



A compact, portable and safe arrangement for the gas-torch equipment.

The box, made of $\frac{1}{8}$-in. steel, is 21 in. wide, 34 in. long and 15 in. deep. Casters are 5 in. in diameter and the top of the box is 22 in. above the floor. To facilitate removal of the generator for cleaning and recharging, the back end of the box is built as a sliding and removable endgate. The oxygen tank rests in a ring on the bottom of the box and at the top is held securely by a half ring and strap. The latter is hinged to the front end of the box and when raised it frees the tank so it can be tipped and lifted out for substitution of a new full tank of oxygen.





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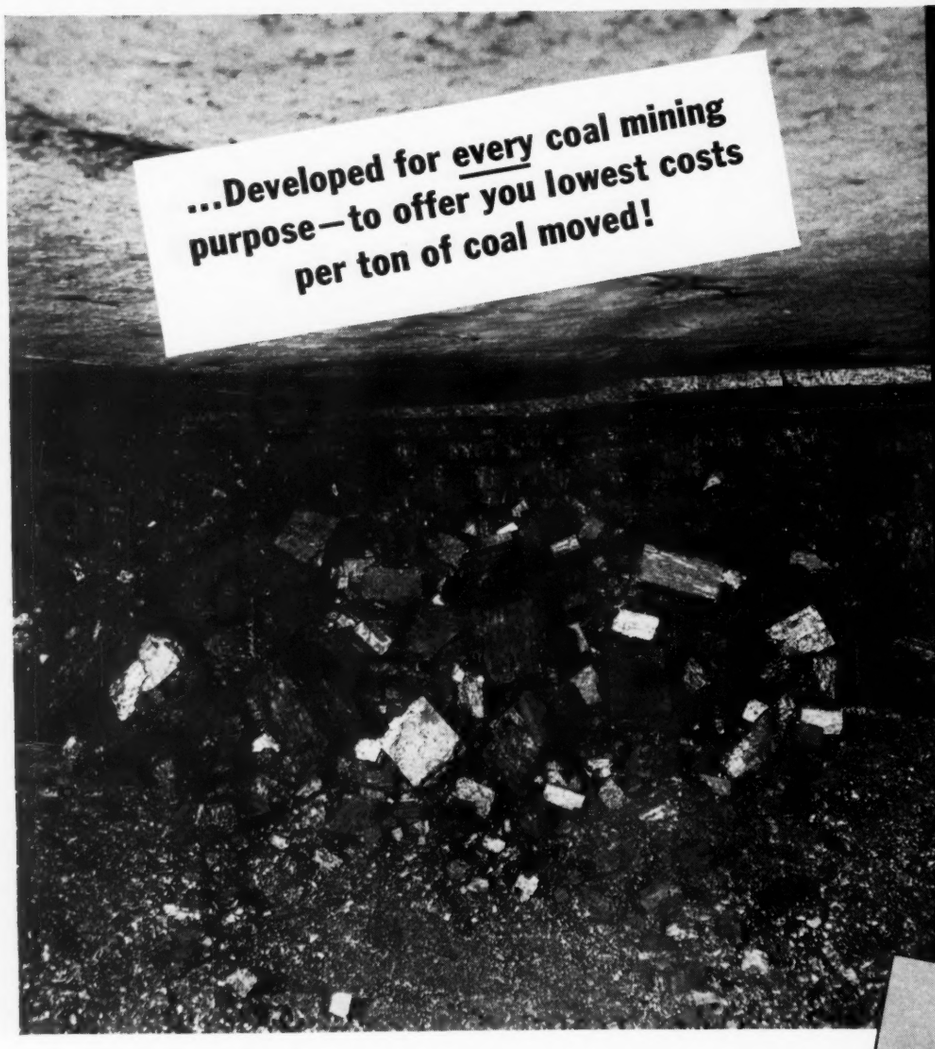

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WHAT'S NEW IN THE FIELD

Anthracite Men Consider Ways To Halt Bootleg Mining

Plans to eliminate bootleg mining operations were discussed by about 50 old line and independent anthracite operators at a meeting held March 13 at the Whitehall Club in New York. One plan under consideration was the absorption of the 3,500 real miners among the 9,000 outlaw producers by the companies and the closing down of all bootleg operations, but no definite agreement was reached.

F. W. Leamy, senior vice-president, Hudson Coal Co., presided at the meeting, which voted to amend the allocation plan now in effect by providing for alternates on both the emergency committee and the producers' advisory board. Alternates named to the emergency committee were: L. R. Close, president, Lehigh Valley Coal Co.; Donald Markle, president, Jeddo-Highland Coal Co.; and James Prendergast, president, Susquehanna Collieries Co.

•

Publicizing and Merchandising Seen as Anthracite Needs

Merchandising is the economic problem confronting the anthracite industry today, and if the industry is to survive it must be properly publicized and merchandised, Oscar F. Ostby, president of the Anthracite Club of New York, declared on March 13 in the annual lecture at Lafayette College, Easton, Pa., under the auspices of the John Markle Foundation for Mining Engineering. Competing fuels are not superior, he contended, but their merchandising is better, and frequently superior merchandising compensates in large measure for inferior products.

"Anthracite, the finest up-to-date household fuel, is worthy of only the best merchandising efforts," said Mr. Ostby. "We must fight with a united front to regain old customers. We must fight to get back into the new-home market, which has been all but lost. We must go out into new fields and new markets to find new uses for anthracite. All of these things we must do if anthracite is to regain its dominant place in the heating field. With the high-grade product we have and the great advance that has been made in anthracite burning equipment and control it can be done. We should, however, apply our efforts to markets where the advantage of anthracite will serve the consumer best and bring reasonable profit to producer and dealer alike."

Discussing oil as a competitor, Mr. Ostby said that nearly 2,000,000 homes are now equipped with oil burners, of which about 250,000 were sold in 1939, an increase of 52 per cent over 1938. Thousands, he said, were installed in old homes in heating plants that were originally designed and built to burn anthracite. Increasing oil prices and actual shortage that occurred in many places this winter should aid anthracite, he continued, adding that oil reserves are being depleted faster in this country than in the rest of the world and that unless a more conservative policy is adopted we will be forced to turn to synthetic gasoline or to expensive substitutes for our supply of liquid fuel.

Blaming interruption in the supply in the past as one of the causes for the decline of the anthracite industry, the speaker expressed the conviction that there is not even the remotest possibility of any further interruption. This opinion, he said, is based not only on the present wage agreement but upon the cooperative spirit now being shown by the United Mine Workers in working out the problems of the industry. Allocation of production, said Mr. Ostby, is expected to stabilize prices and avert destructive price wars, but allocation alone is not sufficient. In any event, he reiterated, modern merchandising efforts must be applied. "Through unity of purpose, eliminating inside cut-throat competitive methods," he concluded, "anthracite markets can be extended at a profit to all."

Keeping Step With Coal Demand

Bituminous Coal Stocks

(Thousands of Net Tons)

	Feb. 1 1940	Jan. 1 1940*	Feb. 1 1939
Electric power utilities..	9,069	9,119	8,379
Byproduct coke ovens...	6,496	7,993	7,374
Steel and rolling mills..	651	692	742
Railroads (Class 1).....	4,992	5,529	5,819
Other industrials†.....	12,385	13,788	10,956
Total	33,593	37,121	33,270

Bituminous Coal Consumption

(Thousands of Net Tons)

	Jan. 1940	Dec. 1939*	Jan. 1939
Electric power utilities..	4,902	4,683	3,595
Byproduct coke ovens...	6,654	6,668	4,751
Steel and rolling mills..	1,106	1,029	858
Railroads (Class 1).....	8,436	7,461	7,149
Other industrials†.....	12,085	11,190	9,832
Total	33,183	31,031	26,185

* Revised. † Includes beehive ovens, coal-gas retorts and cement mills.

Supreme Court Ruling Sought On Validity of Coal Act

An appeal challenging the constitutionality of the National Bituminous Coal Act was filed with the Supreme Court of the United States on March 16 by the Sunshine Anthracite Coal Co., Clarksville, Ark. A three-judge Federal District Court at Little Rock, Ark., upheld the act on Feb. 16 and dismissed the company's petition for a permanent injunction. A temporary injunction was extended for 30 days, however, to permit recourse to the high court. Specifically the company brought suit against Homer M. Adkins, Collector of Internal Revenue for the Arkansas District, to restrain him from collecting the 19½ per cent tax imposed on non-members of the code by Sec. 3 (b) of the act, the petitioner contending that the legislation violated State rights. The court has been requested to expedite hearing of the case so that it may be disposed of at this term.

The Winslow Coal Corporation, a strip operator in Pike County, Indiana, has filed suit in the U. S. District Court of Southern Indiana against the Collector of Internal Revenue for Indiana seeking to enjoin enforcement of the coal act on the ground that the act is in violation of provisions of the Constitution of the United States. Though the corporation accepted the code, and paid the tax for a time, it is now threatened with dismissal from the code and any protection of the act, and feels that the tax provisions in particular and the act in general are outside the authority of the Federal Government.

Machinery has been established by the Bituminous Coal Division to make adjustments in minimum prices or marketing rules and regulations for the sale of coal "at the mine" after they are made effective this spring, Division Director Howard A. Gray announced on March 4. The procedure will provide means for adjustments to meet changes in conditions which take place after prices and rules become effective, and to make any changes which actual experience with them may reveal to be necessary. Special arrangements have been provided to speed up the handling of cases where immediate temporary or preliminary changes are requested while final action is pending.

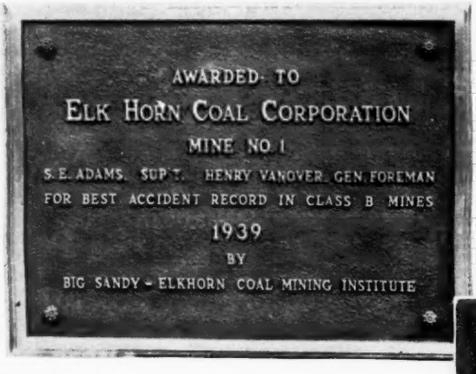
The Pittsburgh Coal Co. took a parting whack at the coal act in its annual report, issued March 12, branding the measure an "expensive, burdensome nuisance." The report, signed by Alan M. Scaife, chairman, and J. D. A. Morrow, president, declared that "of outstanding concern at this time

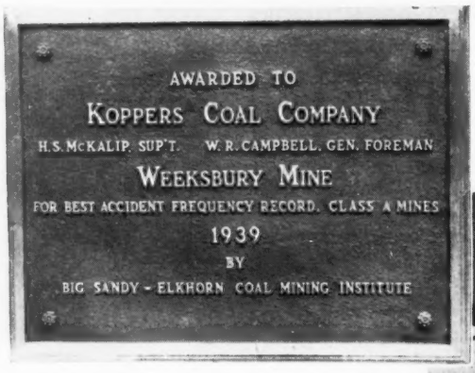
New institute officers. At the left is M. K. Reed, second vice-president, followed by F. M. Correl, first vice-president; W. R. Campbell, president; and A. D. Sisk, secretary-treasurer.

Weeksbury Men Pose With Their Plaque

Standing, left to right: section foreman Nathan Lay, Holly Yontz, John Dutton, Clifford W... Eddie Lewis, Louis Bradford, Sr.; Millard Craynon; Elmer Music, dispatcher; Paul ... ford, lamp-house attendent; Ford Hall, tipple foreman; Dock Fraley, section foreman; and T... Jenkins, engineering department. Kneeling in the front row, left to right: Delbert Hall, s... foreman; E. B. King, coal inspector; Polk Campbell and Jack Welch, section foremen; W... Campbell, general mine foreman; Louis Bradford, Jr., safety director; W. M. Sturgil, elec... department; Tommy Forsyth, lamp-house attendant; and John Slover, section foreman.

T. G. Fear reiterates that very few personal injuries are accidents. Back of him, W. E. Wheeler, Kentucky Department of Mines, gives his full attention.





Receiving the Consolidation No. 204 Aw...

Standing, left to right, F. M. Correll, s... inspector; J. L. Gilley, mine foreman; R... Denny, superintendent; George Higginbot... assistant to the general manager; L. E. K... assistant division manager; and M... Prunty, chief engineer.

C. L. Spradlin, retiring president, presents a bronze lapel button to W. R. Campbell, general mine foreman, Weeksbury. Seated are A. D. Sisk, institute secretary-treasurer, and J. T. Parker, superintendent, Inland Steel Co.

Receiving the Weeksbury Award

Left to right, W. R. Campbell, general mine foreman, and Sailor Bradford, inspector.

Receiving Elk Horn No. 1 Award

Standing, left to right, T. G. Fear, general manager; Boyd Mason, foreman; S. E. Adams, superintendent; Henry Vanover, mine foreman; and Garland Jackson, foreman. Seated is James O. Watson, engineer.

is the uncertainty with which operators regard the publication and enforcement of price schedules" under the coal act.

"Ponderous machinery for adjustment of grievances is provided for in the act," the report continues, "but by the time it functions, the patient may well have died from malnutrition. The act was and is a very unwise piece of legislation. It should be repealed or modified at this session of Congress." Furthermore, the report asserts, the 1c. per ton tax on coal for maintenance of the Coal Division has cost operators $11,000,000, and in addition there is a 0.5c. per ton expense in collecting data, etc.

•

Amended Stream-Pollution Bill Passed by House

The Barkley-Mansfield stream-pollution bill, which had been long pending, was passed by the House of Representatives at Washington on March 1. At a conference with the Rivers and Harbors Committee on the preceding day, in which Chairman Mansfield was unable to take part because of illness, Representative Mundt (R., S.D.) had the following amendment inserted immediately after Subsection c of Sec. 2:

"(d) (1) After date of enactment of this act, no new sources of pollution, either by sewage or industrial waste, shall be permitted to be discharged into the navigable waters of the United States and streams tributary thereto until and unless approved by the Division.

"(2) The discharge of new sources of water pollution without review and approval of the Division, as required under the foregoing provisions, is hereby declared to be a public and common nuisance. An action to prevent or abate any such nuisance may be brought in the name of the United States by any United States attorney, and it shall be the duty of such attorney to bring such action when requested to do so by the Division, the Surgeon General, any duly constituted interstate agency dealing with control of water pollution, any State agency dealing with control of water pollution, any State health authority, or any incorporated municipality. Such action shall be brought as an action in equity and may be brought in any court of the United States having jurisdiction to hear and determine equity cases."

The measure has since gone to conference, where it is likely to remain for considerable time, as the Mundt amendments are expected to stir up a warm controversy.

The House named as its conferees on March 12 the following: Representatives Mansfield (D., Texas), Gavagan (D., N. Y.), DeRouen (D., La.), Seger (R., N. J.) and Carter (R., Calif.). Senate conferees, previously named, are: Senators Barkley (D., Ky.), Sheppard (D., Texas) and McNary (R., Ore.).

•

Urges Standard Signal Code

Recommendations for adoption of a standard code for signals to be used in all mines in Arkansas, and for storing and handling of explosives were contained in a mine inspection report filed March 14 with Labor Commissioner E. I. McKinley. The report, presented by W. H. Tomlinson, associate mining engineer, U. S. Bureau of Mines, Vincennes, Ind., followed a tour in January of Arkansas mining districts with Wilson E. Runton, safety inspector of the State Labor Department.

•

Dust-Blast Codes Published

Under the title "National Fire Codes for the Prevention of Dust Explosions," the National Fire Protection Association has published a 136-page volume which includes: (a) the eleven standard codes for prevention of dust explosions, (b) a statement of fundamental principles of dust-explosion prevention in industrial plants, (c) a record of 670 dust explosions which have occurred in the United States. The codes were prepared by the association's committee on dust-explosion hazards, under the chairmanship of Dr. D. J. Price, U. S. Department of Agriculture. One of them applies specifically to coal pneumatic cleaning plants and another to pulverized-fuel systems.

The recommendations for coal pneumatic cleaning plants cover in detail such subjects as buildings, machines and apparatus, installation of pneumatic cleaning machinery and apparatus, building construction, screen-room arrangement, ventilation, dust collection, vents, coal dryers, storage bins, electrical facilities and fire and explosion protection.

The code on pulverized-fuel systems recommends certain measures to be observed in the installation of all classes of systems. This code is well illustrated for clarity and includes specifications for pipe lines and a recommended procedure for extinguishment of fires in pulverized-fuel conveyors, pipes, ducts, collectors and bins. Also included is a standard method of using carbon dioxide or other inert gas for the prevention of explosions and fires.

•

Safety Awards Presented to Mining Operations At Big Sandy-Elkhorn Meeting

WEEKSBURY MINE, Koppers Coal Co.; Mine No. 1, Elk Horn Coal Corporation; and Mine No. 204, Consolidation Coal Co., shared honors in safety accomplishments for 1939 and were awarded bronze plaques at the annual meeting of the Big Sandy-Elkhorn Coal Mining Institute, Pikeville, Ky., Feb. 23. To foremen whose men suffered no lost-time injuries for periods of one, two and three years, lapel buttons were awarded as follows: silver, W. H. Collins and A. E. Corder; bronze, G. A. Hixon, I. E. Shelby, R. B. Potter, Deb Hall, W. R. Campbell, R. C. Collier and Henry Vanover. Mr. Campbell, general foreman, Weeksbury mine, was elected president of the institute.

To determine the awards for the best safety records, the mines of the district were divided into two classes according to production, each class including an equal number of mines. "For Best Accident Record" among the larger mines (Class A), Consolidation No. 204, Consolidation Coal Co., was the winner. Among the smaller mines (Class B), Elk Horn No. 1 took first place. "For Best Accident Frequency Record," an award made only in Class A, first place went to the Weeksbury mine, Koppers Coal Co.

The Big Sandy-Elkhorn Coal Mining Institute was organized in February, 1937, to promote mine safety and operating efficiency throughout the counties of Johnson, Floyd, Pike and Letcher in Kentucky. A. D. Sisk, safety director, Big Sandy-Elkhorn Coal Operators' Association, serves as secretary-treasurer. The annual meeting, which opened with a dinner at the Hatcher Hotel, brought out an attendance of 150. Speakers and audience were accommodated by a temporary installation of a public address system which is the property of the institute. C. L. Spradlin, retiring president, conducted the meeting and presented the awards. Shortly before the meeting date Mr. Spradlin had resigned as general superintendent of the South-East Coal Co., Seco, to become associated with the Mutual Benefit Life Insurance Co., working out of the Lexington office. G. C. Southerland, safety inspector, Inland Steel Co., Wheelwright, was the first president of the institute and was followed in 1938 by A. B. Brooke, at that time manager of the Elk Horn Coal Corporation.

"An effective program, especially in safety work, must start with the higher-ups," said Mr. Spradlin in an address covering activities and accomplishments of the institute. "I do not mean that the program must be thought of by them, but if not and

Institute Officers

President—W. R. Campbell, general foreman, Koppers Coal Co., Weeksbury.

Vice-presidents—F. M. Correll, safety inspector, Consolidation Coal Co., Jenkins; M. K. Reed, general foreman, Turner Elkhorn Coal Co., Drift; W. E. Hess, superintendent, Elk Horn Coal Corporation, Wayland.

Secretary-treasurer—A. D. Sisk, safety director, Big Sandy-Elkhorn Coal Operators' Association.

Directors—G. C. Southerland, safety inspector, Inland Steel Co.; V. P. Picklesimer, superintendent, South-East Coal Co.; Estil Cox, general foreman, Elk Horn Coal Corporation; B. H. Purser, assistant division manager, Consolidation Coal Co.; Herbert Wheeler, superintendent, North-East Coal Co.; J. H Claggett, preparation superintendent, Utilities Elkhorn Coal Co.; J. T. Parker, superintendent, Inland Steel Co.; Harvey Maynard, safety director, Clear Branch Mining Co.; J. D. Snyder, superintendent, Consolidation Coal Co.; D. T. Lucas, general manager, Goose Creek Mining Co.; A. J. Mandt, general superintendent, Elk Horn Coal Corporation; and J. E. Green, superintendent, Elk Horn Coal Corporation.

if they learn of it, they should put more enthusiasm and pep into it than any other particular persons so the good program may enthusiastically trickle down the forces until the lowest workman is just as thrilled as the president. That, in my opinion, would be an effective safety program. It takes time, it takes thought, gobs of enthusiasm. It's no job for lazy people."

T. G. Fear, general manager, Elk Horn Coal Corporation, briefly complimented the institute for its use of the expression "personal injuries" on its 1939 statistical report instead of the word "accidents." Mr. Fear reiterated that very few personal injuries can rightly be termed accidents, and that therein lies the basis for an effective attack to promote safer working.

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Changes in Sampling Methods To Be Made by A.S.T.M.

A number of changes in the method of sampling of coal were agreed on for recommendation to the American Society for Testing Materials by Committee D-5 on Coal and Coke at its meeting during A.S.T.M. committee week in Detroit, Mich., March 4-8. Tentative revisions of the Standard Method of Sampling Coal for Analysis (D 21-16), to be advanced to standard status, provide for methods of reduction of gross samples of coal by mechanical means which are considerably more accurate than hand methods of reduction because of elimination of personal errors.

Acceptance by the society of this revision as standard will necessitate some changes in the Standard Methods of Laboratory Sampling and Analysis of Coal and Coke (D 271-37), therefore the tentative revisions of those methods are to be recommended for advancement as standard. The committee agreed on a number of revisions of the recent Tentative Method of Sampling Coals Classed According to Ash Content (d 492-58 T). It is believed that these revisions constitute a considerable improvement in obtaining a more representative sample for analysis. The method as revised is to be continued as a tentative standard.

Another action of the committee, relating to the present Tentative Definitions of the Term Coke (D 121-26 T), will be recommended for adoption as standard in a revised form. A. C. Fieldner, chief, Technologic Branch, and acting director, U. S. Bureau of Mines, is chairman of Committee D-5, and W. A. Selvig, senior chemist of the Bureau, is secretary.

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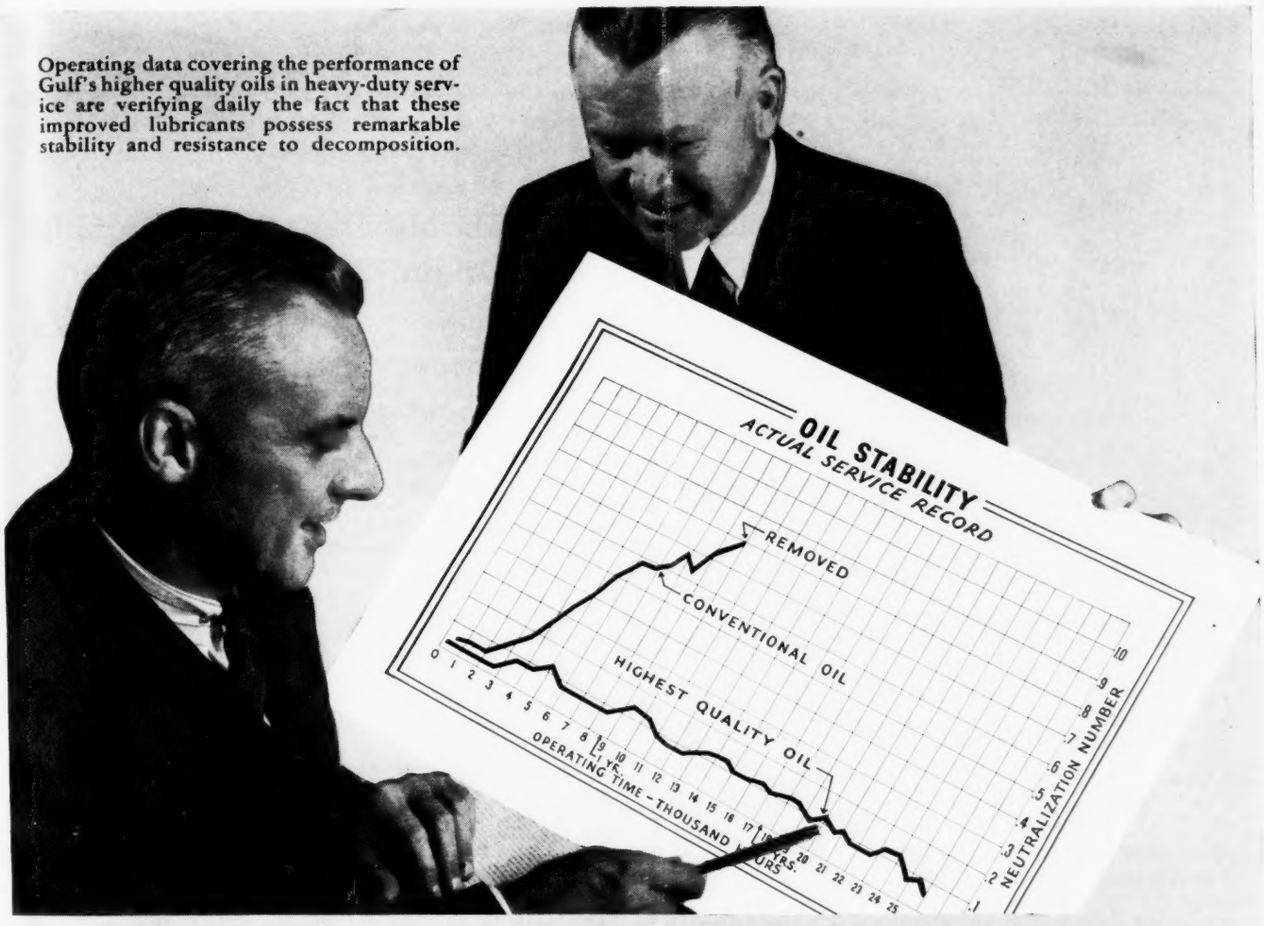
New Preparation Facilities

Colitz Coal Co., Colitz Colliery, Pottsville, Pa.: Contract closed with Finch Mfg. Co. for one 3-ft. Menzies cone separator to clean 12 tons per hour of pea coal.

Motley Coal Co., Motley Colliery, Mayfield, Pa.: Contract closed with Finch Mfg. Co. for one 3-ft. Menzies cone separator to clean 12 tons per hour of No. 1 buckwheat coal.

Pardee & Curtin Lumber Co., Bergoo No. 3 Mine, Bergoo, W. Va.: Contract



GULF'S HIGHER QUALITY LUBRICANTS

. . . help meet today's demand for more efficient production!

Oils with greater stability and higher resistance to decomposition give machines better protection against wear, shutdowns and repair expense

"WE demand oils which retain their essential qualities in long-time service," says this mine manager. "That's why we've standardized on Gulf's higher quality lubricants—they have demonstrated remarkable stability, permitting us to maintain heavy production schedules without frequent shutdowns for adjustments and repairs."

Two lubricants may be manufactured to look alike, and to meet the same specifications—but that's no guarantee they will perform alike! One may retain its lubricating qualities under severe temperature and load conditions, while the other may depreciate and allow friction to take a heavy toll in wear and maintenance expense.

Here's the advantage you get when you use Gulf's higher quality oils: Their greater stability is reflected in the operation of your equipment. These better oils help plant men step up production schedules, cut down costs of machine operation. Savings in maintenance alone often exceed the total cost of the lubricants. Are you striving for such operating efficiency?

Ask the Gulf engineer who calls on you to work with your operating men toward the attainment of proper lubrication for all your equipment. He works tactfully with plant men, has a keen appreciation of their problems. His one aim is to help you make operating improvements which will save money. This cooperative service is extended to public utilities, railroads, industrial and marine operating companies without extra charge.

The Gulf line of more than 400 quality oils and greases is quickly available to you through 1100 warehouses in 30 states from Maine to New Mexico. Write or phone your nearest distributing point today.

GULF OIL CORPORATION · GULF REFINING COMPANY

GULF BUILDING, PITTSBURGH, PA.

GULF INDUSTRIAL LUBRICATION

A COMPLETE LINE OF MORE THAN 400 OILS AND GREASES FOR INDUSTRY

closed with McNally-Pittsburg Mfg. Corporation for equipment to screen out 4x0-in. coal and break plus 4-in. to 4-in. in a McNally-Norton pick breaker; capacity, 240 tons per hour of mine-run.

OLD BEN COAL CORPORATION, No. 14 Mine, Christopher, Ill.: Contract closed with American Coal Cleaning Corporation for one American 5x18-ft. "Twin-Dex" pneumatic separator with auxiliary equipment to treat 60 tons per hour of $^{3}/_{4}$x$^{5}/_{16}$-in. coal; this is additional equipment.

Bartley Blast Probably Due to Gas Ignition Of Electrical Origin, Says Mine Bureau

THE explosion in the Bartley No. 1 mine of the Pond Creek Pocahontas Co., Bartley, W. Va., on Jan. 10—*Coal Age*, February, p. 108—in which 91 men were killed, probably was caused by an electric arc or sparks from mine equipment which ignited methane, which was present in the mine in large quantities, according to a report by the U. S. Bureau of Mines. The report, made following investigation by four Bureau engineers and ordered made public by Secretary of the Interior Ickes, stated that it was virtually impossible to determine exactly where or how the explosion occurred. This was said to be due to the complexity of conditions and the fact that more than one explosion occurred. A second blast, which occurred seven hours after the first, destroyed evidence and created conflicting conditions and confusion of materials, débris and other factors which might have provided the key to the first blast, the report said. The explosion, the investigators believed, was extended in scope and carried through the mine by coal dust.

In announcing that the report would be made available for public inspection, Mr. Ickes said on March 6 that "no inquest has been conducted in connection with the disaster." According to a statement on March 12 by N. P. Rhinehart, chief, Department of Mines of West Virginia, however, his department "has placed its testimony before the coroner's jury, a report of which is in the coroner's office."

M. J. Ankeny and C. W. Owings, mining engineers; M. C. McCall, associate mining engineer, and E. J. Gleim, electrical engineer, of the Bureau, after reviewing operation methods in the mine, type and condition of machinery, and the condition of the mine just before the explosion as nearly as it was possible to do, said in their report:

"1. The investigation disclosed no evidence that any shots were being fired at the time of the explosion, or that any fires had been started by blasting.

"2. No open lights were used. Although two cigarettes were found in the jacket of one man, no matches were found and no evidence was discovered to indicate that anyone was smoking.

"3. All flame safety lamps found near the working places were examined by a committee of one company representative, one Bureau of Mines representative and one State mine inspector, and no defects found.

"4. Several possible electrical ignition sources were found. The surrounding circumstances failed to indicate the point of ignition; however, it is probable that the explosion was of electrical origin."

A number of instances were found where "permissible" electric mining equipment had been allowed to lapse into a "non-permissible state." In several cases, cables carrying electric power to working equipment in the mine were found in non-permissible condition; several contacts, switches and connections were found to be in non-permissible condition; in some instances the equipment itself was non-permissible for use under gassy mining conditions.

"Among the possible sources of ignition that might have caused this disaster," said the report, "the condition of the electrical equipment and the cables connected thereto leads the investigators to believe that the probable source was an electric spark or arc. This belief is based upon the multiplicity of substandard electrical conditions rather than upon the findings on any specific machine or cable."

There was evidence in one instance that workmen in the mine were splicing a live cable in violation of company regulations. In this instance the bodies of two men were found with a portion of a feeder cable which had been thrown by the explosion across the

Coming Meetings

- American Chemical Society: 99th meeting, April 8-12, Cincinnati, Ohio.
- Midwest Power Conference: April 9 and 10, Palmer House, Chicago.
- International Acetylene Association: 40th annual convention, April 10–12, Milwaukee, Wis.
- American Mining Congress: seventeenth annual coal-mining convention and exposition, April 29-May 3, Music Hall, Cincinnati, Ohio.
- Anthracite Industries Conference: May 9 and 10, Lehigh University, Bethlehem, Pa.
- Northern West Virginia Coal Association: annual meeting, May 13, Fairmont, W. Va.
- Mine Inspectors' Institute of America: annual convention, May 27-29, Claypool Hotel, Indianapolis, Ind.
- Stoker Manufacturers' Association: annual convention, June 6 and 7, Hot Springs, Va.
- Rocky Mountain Coal Mining Institute: annual meeting, June 6-8, Cosmopolitan Hotel, Denver, Colo.
- Big Sandy-Elkhorn Coal Operators' Association: annual meeting, June 7, Ashland, Ky.
- Illinois Mining Institute: 22d annual boat trip and summer meeting, aboard Str. "Golden Eagle," leaving St. Louis June 7 and returning June 9.
- American Society for Testing Materials: 43d annual meeting, June 24-28, Hotel Chalfonte-Haddon Hall, Atlantic City, N. J.
- Sixth Annual Southern Appalachian Industrial Exhibit: Aug. 22-24, Norfolk & Western Freight Terminal, Bluefield, W. Va.

ELMORE CONTINUOUS CENTRIFUGAL DRYER

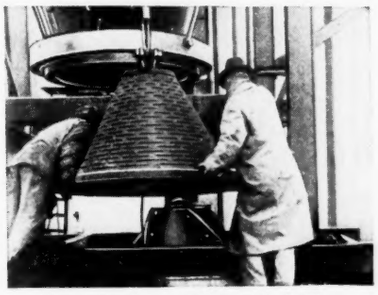
• WHAT becomes of fine-size fuel values in unprocessed slurry is now answered almost like the child's query of what becomes of the white when the snow melts. That it disappears—and forever—is certain, but how much is recoverable and where it may be marketed are questions with which the industry seems too little concerned for its own bank roll.

Reproduced from

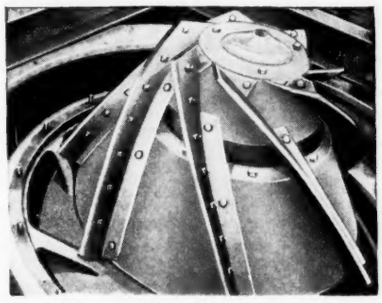
COAL AGE editorial page

February 1940

AFTER READING THIS.. *read what* THE ELMORE CAN DO FOR YOU IN FINE COAL RECOVERY AND IN COST SAVINGS • • • • •



View showing screen basket being superimposed on inner core.



View showing inner cone with flights.

Will either dry your 3/8" to 0 washed coal or reclaim the sludge from your washery.

Makes it possible for you to turn your sludge into a salable product at low cost.

Makes it possible to reduce moisture and ash content and removes coal from slurry, making large daily savings.

Because it drys your fine coal it ends the problem of coal freezing during shipment.

Saves considerable in capital investment such as for equipment and buildings.

Saves in coal consumed because the ELMORE requires no heat—power costs are low.

Saves on the maintenance cost per ton of coal processed.

Gives you more tonnage while keeping costs down.

Saves much in time and labor costs.

We will be exhibiting at the Mining Congress show in Cincinnati. See us in booth "L".

Recent installations

An ELMORE Continuous Centrifugal will be installed at the Delta Coal Mining Company's plant at Carrier Mills, Illinois, to handle 26 tons per hour of 10 mesh by zero coal plus 65 tons per hour of water. This material will be pumped to the dryer from the re-settling cone, the problem being one of sludge recovery.

An ELMORE Continuous Centrifugal has been installed at the Utah Fuel Company's Castle Gate plant in Utah. It is to handle 50 to 60 tons of minus 3/16" coal with a wet coal feed containing 25% to 30% moisture and reduce this moisture to 6½% to 7%.

WRITE TODAY FOR COMPLETE DATA

CENTRIFUGAL AND MECHANICAL INDUSTRIES, INC.

Main Office & Plant: 146 President St., St. Louis, Mo.
Branch Office: 1003 Sycamore Bldg., Terre Haute, Indiana

Miner Turns Archeologist

Ed Woolsey, veteran shovel runner for the Enos Coal Mining Co., took a chew from a plug of tobacco, leaned back for a yank at the controls of his "Betsy," and started the big shovel biting into the dirt in the company's strip operation near McCullough Springs, Ind.

Ed. has been doing this for years and seeing buckets of dirt, rock and coal come up, but this time he was shocked to see a bundle of bones sticking out of the maw of the bucket. Closer inspection revealed the skeletons of three Indians and a pony, surrounded by several aboriginal cooking utensils. The artifacts dug up by the shovel included some 60 beads made of bone, two bone needles, a copper awl with a bone handle, and many ax and arrow heads, all in excellent state of preservation.

Local legend places the spot as the scene of an Indian battle about 150 years ago. Near by is an old Indian burial ground, identified by the characteristic Indian burial mounds so common throughout the Central and Western States.

body of one of the men. The end of the cable leading toward the battery was found to have been carefully trimmed, with conductor exposed, strongly indicating that the men probably were in the act of splicing the cable when the explosion occurred. Power was indicated to have been on the line while the splicing was being done. Company regulations prohibit anyone but a shotfirer or a foreman from splicing cable and forbid this action while power is on the line. Lack of junction boxes or connector plugs, however, the report points out, would have made it necessary to cut power off from the entire section in order to make the repair. The investigators expressed the opinion that the cable-splicing "constitutes the most likely ignition source in the 3 and 4 Left Flat section."

In another section of the mine, a fall of débris was found to have cut a power cable leading to a conveyor, and the report states that "it is strongly suspected that the second explosion originated at this point."

Drawing conclusions and lessons from the disaster, the report said: "In very gassy mines, ordinary precautions in the use of electrical equipment are not sufficient. The elimination of all trolley and feed wires by the use of portable power tanks, and the use of permissible equipment as originally planned, indicate that more than ordinary precautions were intended. The mistake seems to have been a lack of understanding as to the necessity of the proper maintenance of this equipment to keep it safe: also the possible hazards resulting from the modification of such equipment apparently were not realized. Had none but strictly permissible equipment been used, and had the safety precautions that are given on the approval plate of each permissible machine been followed, practically all of the criticism of the electrical installation would have been avoided. Therefore the

Don't let dust beat you!

SOME MINES treat coal well. Some treat it inadequately. Some not at all.

But if you are a coal dealer, your business is your own. If dust is ruining it, driving your customers to gas, oil, and electricity, or to other coal dealers, you must defend yourself.

Now you can do it, with

Coaladd

Coaladd is that tried and proved dust remedy, Coalaid, in a new form. But while Coalaid can be handled only in tank car lots, Coaladd is sold in dry granular form in hundred pound paper bags. No yard is too small to use Coaladd on any size or type of coal.

Coaladd, properly mixed with water and sprayed on the coal, gets rid of 95% of all perceptible dust. Under normal conditions the treatment lasts until the coal is burned. Coaladd does not injure iron, steel, rubber, or compound belting. It reduces fly ash and degradation. And best of all, it can be used right in your own yard, under your own supervision, on your own coal. Exhaustive tests at Armour Institute have proved the complete effectiveness of Coaladd. But you can satisfy yourself by comparing untreated coal with Coaladd-treated coal in the free demonstration kit which we shall be glad to mail to any coal dealer on request. *Send for it today.*

SEALED Coaladd PROTECTION

The Johnson-March Corporation

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Coaladd is manufactured for Johnson-March and distributed nationally by The Dow Chemical Company, Midland, Mich.

lesson to be learned from this explosion is that permissible equipment not carefully maintained introduces unsuspected hazards, thus giving rise to a false sense of security."

Where extremely gassy mines are involved, the report also pointed out that extraordinary precautions should be taken in ventilation and inspection. In mines of this character, it said, provision should be made to keep caved-in areas as free of gas as is possible by bleeder rooms and entries and that constant vigil should be maintained to keep a check on conditions. It declared that every precaution should be taken against interruption to ventilation and that air currents should have proper sweep. Application of rock dust even in large quantities over thick accumulations of combustible dust, it held, does not afford adequate protection. It advocated liberal use of water to allay dust at its source. The explosion also showed, it said, that low-volatile coal produces dust just as explosive as high-volatile coal. It also classed as unsafe the practice of storing explosives in fabric bags hanging from timber and said that detonators found scattered by the blast demonstrated that the shotfirer should carry the detonators with him at all times.

In reviewing practices of the company, the report pointed out that it used many commendable safety practices. Men were checked in and out of the mine, enabling the operators to know definitely who was in the mine and approximately where they were working. A safety inspector was employed to instruct men in safety methods. Workers were searched to prevent the carrying of smoking materials into the mine. Monthly safety meetings were conducted and safety bonuses were distributed. All employees were trained in first aid. Permissible equipment was used and rock-dusting employed, although maintenance of the equipment and the application of rock dust was not adequate under the circumstances. Permissible explosives were used exclusively, and all workmen were required to carry proper lamps and personal equipment.

Various recommendations were made in the report which would make the mine safer for operation. It urged that sufficient ventilation be provided so that the methane content of the air would not exceed 1½ per cent in any working place. If this figure should be exceeded, men and electrical equipment should be withdrawn, it said, until the gas is reduced. Working

Permissible Plates Issued

Three approvals of permissible equipment were issued by the U. S. Bureau of Mines in February, as follows:

Sullivan Machinery Co.: Type 7-AU mining machine; two motors, 50- and 30-hp.; 440 volts, a.c.; Approval 356-A; Feb. 12.

Goodman Mfg. Co.: Type 512-CL3 shortwall mining machine; 50-hp. motor; 220 volts, a.c., with cable-reel truck propelled by 10-hp. motor, 250 volts, d.c.; Approval 393; Feb. 13.

Joy Mfg. Co.: Type PL-11-2P elevating conveyor; 7½-hp. motor; 500 volts, d.c.; Approval 380-A; Feb. 23.

Long Live BEARINGS!

Three ways to help: consider the effect on your oils of LOAD, of HEAT, of CONTAMINANTS

LET'S LOOK at bearing lubrication through the eyes of your plant engineer—a highly practical person. He usually does little talking about lubrication theories. He sees lubrication as one of the important means to the end he's after . . . which is to give you all the operating efficiency your machines can deliver at the lowest cost.

But he's thinking always of your actual machines—some of which have to work under abnormal conditions. Does it pay you to run one of them at a fairly consistent overload? Very well; he'll just have to adjust his lubricant to that overload. Perhaps another one has to inhale a lot of sulphur; a third works in atmosphere choked with dust. He'll just allow for those contaminants in figuring what oil best does the job, and how best to purify it.

Among the many conditions he deals with, in choosing and controlling his lubricants, he's certain to lay emphasis on these three: operating *loads;* range of bearing *temperatures;* extent and kind of *contamination.*

The Load on a Bearing

The job of a bearing lubricant, stated simply, is, of course, to form an oil film that keeps the metal of the journal from touching metal of the bearing. It's always easy enough to agree on basic theories.

But let's suppose that in one of your bearings you've figured on a normal unit of pressure of 500 lbs. per sq. in. Under that load the oil you're using maintains a perfect oil-wedge formation, like that in Fig. 3 above. Later, it happens to make sense for other reasons to throw an extra 200-lb. load on that bearing. As the journal is pulled downward, the oil film on the pressure side becomes thinner . . . and thinner. Does it reach the danger point? That depends on what adjustments your engineer has made in his oil.

How Much Heat?

Yet he can never deal with this problem in isolation. He must at the same time keep in mind the bearing temperature. Temperature, as you know, acts upon oil viscosity both as cause and effect. Is viscosity too low? The oil may be squeezed out—result: metal-to-metal friction—and up goes the heat. Yet too heavy an oil sets up excess fluid friction, generating and holding heat: bad first for the oil; soon after, hard on the bearing.

Here, too, your engineer gets the effective lubricant only by considering in each of your bearings *all* the factors that may alter the temperature.

Three Stages in the Formation of the Oil Wedge

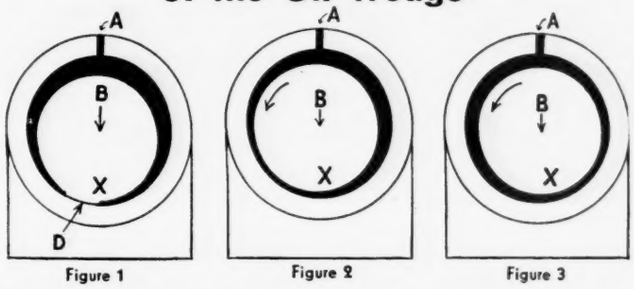


Figure 1 — Journal (X) at rest. Metal-to-metal contact and high-pressure point at (D). Load (B) vertical. Lubricant-introduction point at (A).

Figure 2 — Journal (X) starting in motion. Oil film and wedge create high-pressure point where metal-to-metal contact existed in Fig. 1.

Figure 3 — Journal at full speed. High-pressure point has moved to the right following direction of journal motion and pressure of oil wedge.

Contamination—and Control

Then there's the question of contaminants of all kinds. Your engineer never forgets the active agents that set busily to work on a fresh lubricant as soon as it's in. He has to know where oxidation may occur with each lubricant. He knows when the resulting sludge is apt to fill up oil grooves or clog feed lines.

At least, he knows all these things to watch for, and many others, too, if he's going to insure your bearings the care that they deserve. Shell has often helped, from its years of experience in a variety of bearing problems, to supply the one or two clues which may be all you need to improve your bearing operation or to lower your operating costs. Call in your Shell lubrication man. You and he have the same end in view . . . longer life for bearings.

SHELL

SHELL Industrial Lubricants

places should be examined for gas every two hours by a competent mine official, it recommended.

To reduce dust, it was urged that provision should be made for applying water on the cutting bars of all mining machines and the cuttings should be wetted. Water should be used to wet down working places, tops of loaded cars, coal faces and areas 40 ft. from the working place. Sufficient rock-dusting to provide ample incombustible content was urged. Vigil should be maintained to remove coal dust and to take frequent dust samplings. Various suggestions were made as to the care and storage of explosives and the care and maintenance of the electrical equipment.

That additional ventilating shafts be constructed was among recommendations put forward by Daniel Harrington, chief, Health and Safety Branch of the Bureau, in comments appended to the report. Asserting that the mine is one of the most gassy in the United States, Mr. Harrington declared that the present ventilation system is inadequate to handle necessary quantity of air and fails to carry off gas in disused sections. He also stated that while blasting was absolved of blame in the explosion, "the practices with regard to explosives were such that failure to cause explosions because of blasting can be considered almost a dispensation of Providence." With conditions so hazardous, he said, explosives should not be permitted in the mine during working hours and that no blasting be done during the working shifts.

Cites Danger of Smoking

Smoking cannot be dismissed as a possible cause of the blast, Mr. Harrington commented. Citing the instance of another explosion in the neighborhood which was caused by a workman smoking, he said, "the fact that the report shows that on the day of the disaster a man smuggled cigarettes into the Bartley mine with its desperately gassy conditions (certainly known to all of its employees) means that that man (and possibly others as well) smoked in the mine on the day of the explosion, and if smoking was done at all, the smoker would most probably go to some out-of-the-way place to do it, such as the gob region, where gas accumulations were most likely to be found. There is good reason for a strong suspicion that smoking was involved in the origin of this disaster, even though neither matches nor burned cigarette butts were found and even though no evidence was obtained from bosses or workers that the no-smoking rule was disobeyed either habitually or occasionally.

"In the exclusion of power lines (including the death-dealing electric trolley haulage system) from this mine, with substitution of permissible power tanks and permissible storage-battery locomotives," he added, "this mine went farther toward trying to prevent accidents, including disasters due to electricity, than any other coal mine in the United States except possibly three or four; and the efforts of these three or four in this direction merely equaled rather than excelled that of this mine." Yet, said he, the company had relaxed its vigilance in connection with small details of handling and maintaining its equipment and ventilation system.

CUTS OIL CONSUMPTION 60%

CUTS OIL CONSUMPTION 60%

"O.K.! BUT WHY REPEAT THAT?"

● FIRST, because StanoCyl, itself, *repeated* that cost-saving record—just like that—at *one* midwestern coal mine. Here's the story:

A Standard Lubrication Engineer was called in to cure the excessive oil consumption on a Corliss Valve engine. By installing a Superla Atomizer and using StanoCyl W, he reduced oil consumption 60 per cent. The same company had a piston valve engine which was an oil hog. The same treatment was tried. *The same saving resulted*—another 60 per cent reduction in oil consumption.

But there's another good reason for "repeating" cost-cutting records like that. StanoCyl itself is repeating them in power plants throughout the Middle West day-in-and-day-out. And maybe, if we repeat these factual stories to you *often enough*, we can persuade you to let a Standard Lubrication Engineer *show you* what StanoCyl can save on *your* engines!

You can reach these men through your local Standard Oil (Indiana) office, or by writing 910 South Michigan Avenue, Chicago, Illinois.

STANOCYL

STEAM CYLINDER OIL

ANDARD OIL COMPANY (INDIANA)

Use of Soft Solders Discussed By Mining-Electrical Group

Properties and application of tin-lead-alloy solders were canvassed at the regular monthly meeting of the Mining-Electrical Group of Southern Illinois, held at West Frankfort, March 1, with Russell W. Shoup, chemist, National Electric Coil Co., as the principal speaker. In discussing the properties of various tin-lead alloys, Mr. Shoup pointed particularly to the 63-37 combination (Table I), which both melts and solidifies completely at 358 deg. F., which also is the lowest temperature at which any lead-tin alloy or lead or tin alone will liquefy completely.

Because of this melting and solidifying at the same temperature, the 63-37 combination is termed a "eutectic" compound. In other combinations, there is a certain temperature range between complete solidification and complete melting where part of the compound is liquid and the remainder is solid. This condition is illustrated in

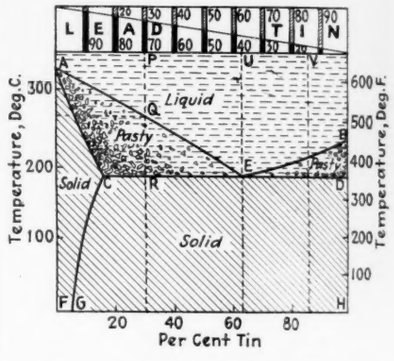


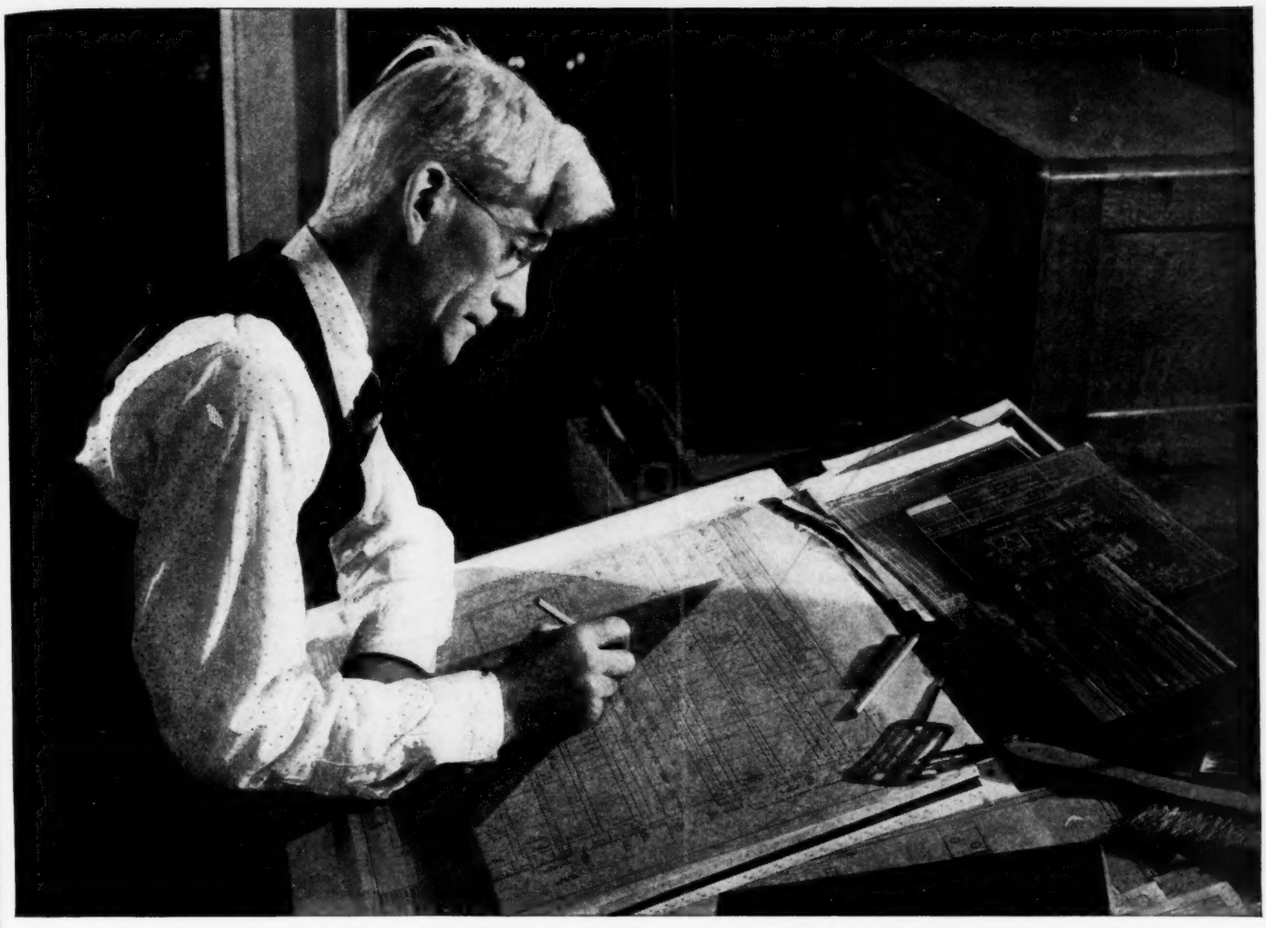
Fig. 1—Tin-lead equilibrium diagram.

Fig. 1, where the line *CD* represents 358 deg. F., where nearly all tin-lead combinations start to melt, and the line *AQEB*, the complete liquefaction temperature of all tin-lead solders. Because of its lack of undissolved lead or tin, it naturally would be expected that the eutectic alloy would be the stronger. This conclusion is borne out by the data in Table II.

Small additions of antimony increase the strength and hardness of tin-lead alloys, as indicated in Table II. Antimony also decreases conductivity. The relative conductivity of the various solders listed in Table II averages 11 per cent of copper, while 50-50 solder has a conductivity slightly less than this average. From this it will be seen that the solder cross-sections must

Table I—Melting Points of Lead-Tin Alloys

Composition		Melting Points	
Lead, Per Cent	Tin, Per Cent	Complete Liquefaction Point, Deg. F.	Solidification Point, Deg. F.
100.0	0.0	620	620
90.0	10.0	576	435
87.5	12.5	565	397
85.0	15.0	554	358
75.0	25.0	514	358
65.0	35.0	477	358
50.0	50.0	414	358
37.0	63.0	358	358
25.0	75.0	378	358
10.0	90.0	415	358
0.0	100.0	450	450



FATHER OF 20

Ideas conceived in the mind are born on the drafting table. Twenty such brain children, all of them fundamental advances in battery construction, have been fathered by A. H. Snyder, Chief Design Engineer for Gould Storage Battery Corporation. There was an idea for ventilation of a sealed submarine battery, another for a terminal connection, several that resulted in new ways to support free ends of plates and separators. These and many others conceived by Mr. Snyder have been patented during the 42 years that he has been associated with Gould. Most of these improvements in battery construction were inspired by problems posed by our customers.

Have you a battery problem? Is your business different? Inquisitive minds at the Gould factory welcome out-of-the-ordinary jobs. We have solved problems for every industry — railroads, mines, utilities, telephone companies. We should like to pit our wits against *your* problem. Write Gould Storage Battery Corp., Depew, N. Y.

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Table II—Physical Properties of Soft Solders

Composition: Per Cent			Shear Strength, Tons per Sq. In.	Tensile Strength, Tons per Sq. In.	Hardness Brinell	Conductivity, Per Cent of Copper	Melting Range	
Tin	Lead	Antimony					Deg. F.	Deg. C.
100	—	—	1.28	0.94	4.6	13.9	450–450	232–232
95	5	—	2.0	2.0	—	13.6	361–431	183–222
95	—	5	2.68	2.65	13.3	10.9	451–455	233–235
65	35	—	2.78	3.4	14.0	11.8	361–369	183–187
64	35	1	2.86	3.89	16.5	11.4	363–370	184–188
50	50	—	2.0	3.0	12.6	10.7	361–417	183–214
50	47	3	3.06	3.75	15.6	9.6	365–397	185–203
35	65	—	2.13	2.9	11.3	9.7	361–482	183–250
0	100	—	0.896	0.89	4.1	7.91	620–620	327–327

have ten times the conductor area to maintain equivalent conductivity

Of the various stresses—impact, tension and shear—to which solder is subjected, its action under shear is the most important, said Mr. Shoup, because of the character of the stresses usually set up in the soldered joints of electrical machinery. Of the various types of soldered joints—butt, lap, scarf or sleeve—the latter is the best. An important factor is "tinning" the wires, or leads, where the joint is to be made to secure the strongest possible connection. The tinning metal should be of a type which will not be weakened by dilution by the solder itself. Most manufacturers use a high tin-content metal for this purpose.

Tests indicate that a solder-film thickness of about 0.004 in. makes the strongest joint. Another important item is the flux. Zinc chloride is best but must be used at temperatures high enough to vaporize the flux—262 deg. C. or 503 deg. F. Lower temperatures leave flux in the solder and weaken the joint. Adding approximately 30 per cent ammonium chloride lowers the necessary soldering temperature to 356 deg. F. These active fluxes usually are avoided for electrical work because of their corrosive effects, resin solutions, petrolatum and oils being preferable. Where several wires per slot are to be soldered, the flux should be applied to the leads as inserted.

Selection of the correct solder for a certain job may be made from the data in Table II. For stator and "Class A" armature work, 50-50 and 65-35 solders are considered good. For "Class B," or high-temperature work, the 95 tin-5 antimony is cheaper than 100 tin and greatly superior in strength and hardness. Tin dissolves copper. Therefore, manufacturers tinning large quantities of leads ship their metal back to the refiner for purification when it becomes too contaminated for most effective work.

•

Census of Coal-Mining Industry Soon to Be in Full Swing

THE-GO-AHEAD signal for marshaling together the multitude of facts and figures for the 1939 census of the bituminous-coal-mining industry has been sounded. Early in March the plan of procedure for carrying forward this task was signed by the directors of the two Federal agencies which have joined forces in this undertaking, the Census Bureau of the Commerce Department and the Bituminous Coal Division of the Interior Department.

Initial work on this census has been under way for many months. With all details of the plan for collecting, tabulating and publishing the data now laid out, the bituminous operators will soon join those in the anthracite regions in filling out blanks on question sheets mailed to them from Washington. Separate sets of questions were sent to the anthracite producers in January. The census of these mines, as usual, is being conducted exclusively by the Census Bureau.

Under the cooperative plan the task of collecting all information on last year's activities in the bituminous mines is assigned to the Bituminous Coal Division, and the work of editing and publishing the facts and figures will be done by the Division of Mines and Quarries of the Census Bureau, headed up by Dr. O. E. Kiesling, formerly of the Bureau of Mines.

This year marks the 100th anniversary since the first census of mines and quarries was taken, and the 150th anniversary since the first count of the population—in 1790. The census of mines and quarries will be a sequel to and an amplification of all information collected for previous years by the Census Bureau and the Bureau of Mines. In addition to this, there will be the usual analytical study of production and prices made each year by the Bureau of Mines.

The bituminous questionnaires, which call for the essential data on output, shipments, equipment, employment and expenditures, are the result of many months of conferences by representatives of the bituminous industry and the two coal divisions at Washington. To simplify the work of those who supply the answers, three sets of questions have been prepared, each containing only those which are strictly applicable—one for mines with 50 or more tons daily output, one for mines with less than this tonnage and one for central offices. Then, too, as stated on each questionnaire, "the questions are so framed as to supply data needed for administration of the Coal Act and, at the same time, to provide statistics for bituminous-coal mining for the Sixteenth Decennial Census." Thus no one engaged in any activity will be required to answer more than one set of questions.

Among the new data this year's census will make available on both bituminous and anthracite mining operations will be that on mechanization. A special study will be conducted on the development of mechanical loading. An inventory will be taken of the various types of loading devices below

ground and above. Each type and make of loader will be classified by the tonnage it handles and the kind of power used. Scraper hoists will be classified according to their rated capacity. Statistics also will be recorded on the production by the various kinds of mining methods. There will be figures too on the number of each type of machinery and equipment used in 1939, as well as the tonnage and sizes of coal cleaned, the number of days mines were producing, and the daily output.

Also included will be statistics on the number and horsepower rating of all prime movers, generators and motors used for driving loading machines, locomotives, undercutters, and all machinery, mobile and stationary, underground and on the surface, including that installed in power plants, tipples and breakers. For the first time, data will be collected on expenditures during the year for new machinery, plant extensions and alterations.

Supplementing the data on mechanized operations will be the most complete information ever collected on man-hours. This will include: how many men were employed in actual production, development, and maintenance work, number of days they worked, total number of man-shifts and of workers on each shift, and length of shifts.

To Show Efficiency in Power Use

Recent studies show that in 1937 the electric industry obtained from every pound of coal more than twice as much electricity as in 1920, but that its consumption of coal for this purpose remained at approximately the same level during this period. New light will be thrown on the trend of efficiency of manufacturing industries during recent years by the 1939 figures in the census of manufacturers on the consumption of fuels and electric energy.

Comparative figures are now being collected on the quantity of coal and competing fuels used last year by manufacturers, as well as the amount of electric energy generated in the plant, purchased and sold. Similar figures on the consumption of the mines themselves will be recorded in the census of the coal-mining industry. From this information market analysts will be able to determine not only the trend of competition with other fuels but the amount of energy produced per ton of coal, or the equivalent in competing fuels.

The tons of coal sold and shipped last year, by rail, water or truck, and the distances hauled also will be recorded in this year's census. The new housing census, which will cover 35,000,000 homes, will reflect the trend of utilization of modern appliances for the home, including those for heating and cooking.

To complete the picture of mining activities last year, comprehensive data will be made available on contracting companies which build tipples and breakers, sink shafts and render other services for bituminous and anthracite companies, as well as on individual preparation companies which serve anthracite producers.

How quickly the information can be made available will depend largely upon the industry itself. With full cooperation, all the facts and figures will be reported to Washington by the end of April, and most of the basic information will be published by late

summer or early autumn. Each operator in the bituminous industry is requested to forward his schedule, after filling in the answers, to the nearest regional office of the Bituminous Coal Division. Anthracite coal companies have been requested to forward their schedules direct to the Census Bureau in Washington. As in all census undertakings, the answers to the questions are strictly confidential. The same law which requires companies and individuals to supply the answers protects them against disclosure of individual returns.

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Personal Notes

DAVID BROWN, formerly mine foreman with the Tennessee Coal, Iron & Railroad Co., has been named superintendent at the company's Hamilton mine, Pratt City, Ala., vice Arthur Waldman, promoted.

JOHN C. COSGROVE, consulting engineer, Johnstown, Pa., and well known as a former coal operator, has been retained by the Peerless National Pottery, Inc., Evansville, Ind., to assist in modernizing its plant, equipment and practices.

W. T. DALTON resigned March 1 from the position of chief electrician and master mechanic, Gauley Mountain Coal Co., Ansted, W. Va., to accept a similar position at Wharton mine of the Koppers Coal Co., Wharton, Boone County, W. Va.

H. F. HEBLEY, in charge of product control department, Pittsburgh Coal Co., Pittsburgh, Pa., was appointed representative of the American Institute of Mining and Metallurgical Engineers on Committee D-5 on Coal and Coke, American Society for Testing Materials, on March 21.

R. E. HOWE, president of Appalachian Coals, Inc., has accepted appointment as a member of the committee on principles of Americanism of the National Association of Manufacturers.

DR. FRANK W. HURD has been appointed a member of the staff of the chemical engineering division of the research foundation of Armour Institute of Technology, Chicago. His work will be in the field of special fuel-development problems.

GEORGE A. LAMB, assistant to the late F. G. Tryon, has been appointed acting chief of the research section, Bituminous Coal Division, Department of the Interior. He has been with the National Bituminous Coal Commission and the Bituminous Coal Division for the last three years.

J. J. MORRIS has been promoted from mine electrician to chief electrician of the Kayford (W. Va.) district by the Truax-Traer Coal Co.

BRUCE PAYNE, president, Payne Coal Co., Wilkes-Barre, Pa., has been elected treasurer of the Anthracite Operators' Association, organization of independents.

V. D. PICKLESIMER, formerly purchasing agent and master mechanic, has been promoted to general superintendent of the South-East Coal Co., Seco, Letcher County, Ky. He takes the place vacated by C. L. SPRADLIN, who resigned to become associated with the Mutual Benefit Life Insurance Co.

KLINE ROBERTS has resigned the secre-

taryship of the American Retail Coal Association to accept an executive position with the newly created Solid Fuel Institute of Milwaukee, Wis.

A. HIRAM SHAFER, formerly assistant division superintendent, Powellton Division, Koppers Coal Co., is now with the engineering department of the Pond Creek Pocahontas Co., Bartley, W. Va.

ARTHUR WALDMAN, heretofore superintendent of the Hamilton mine of the Tennessee Coal, Iron & Railroad Co., Pratt City, Ala., has been appointed chief engineer of the company's coal mines division, vice I. W. MILLER, resigned.

C. W. WALKER, formerly superintendent of Mine No. 14 of the Island Creek Coal Co., Holden, W. Va., has been appointed general superintendent of the Pond Creek Pocahontas Co. and is now stationed at Bartley, W. Va. G. J. STOLLINGS, who had been managing both the Pond Creek Pocahontas Co. and Mallory Coal Co., relinquished the former duties to continue as vice-president and general manager at Mallory.

A. H. WOODWARD was reelected chairman of the board of the Woodward Iron Co., Woodward, Ala., at the annual meeting of directors. Other officers renamed are: H. A. BERG, president; R. M. MARSHALL, vice-president and secretary, and D. T. TURNBULL, assistant secretary-treasurer.

●

St. Louis Drafts Anti-Smoke Bill Based on Committee Report

Work of putting the recommendations of the Municipal Smoke Elimination Committee of St. Louis into ordinance form began early in March, the bill to be ready for introduction in the Board of Aldermen before that body adjourns in April. The measure will embody the suggestions of the committee for ridding the city of smoke by 1942, said Mayor Dickmann. Unanimous approval of the committee's report, presented on Feb. 24, was voted at a luncheon meeting of the directors of the Chamber of Commerce at the Noonday Club. About 30 directors attended the meeting and heard an explanation of various phases of the report by James L. Ford, Jr., chairman of the committee. The meeting also approved the report of the special smoke committee of the Associated Engineering Societies made in connection with the work of the Smoke Elimination Committee.

Basis of the control plan is passage of an ordinance requiring use of either smokeless fuels or automatic equipment for burning raw coal. John B. Sullivan, secretary to the Mayor and the only lawyer member of the committee, is in charge of drafting the bill. He is being assisted by Mr. Ford, Smoke Commissioner Raymond R. Tucker, a committee of three business men named by Thomas N. Dysart, president of the Chamber of Commerce, and a representative of the Board of Aldermen.

A series of experiments is being held in the mechanical engineering laboratory at Washington University under the supervision of Dean Alexander Langsdorf and Arch R. Burgess, engineering instructor. These different fuels are being tested; coke made

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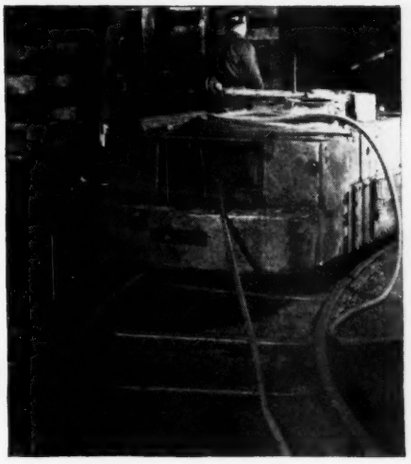

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With all-steel track you can run heavy equipment with a minimum of maintenance or derailment troubles. The track is sturdy and firm, for the clips on U·S·S Steel Ties hold tightly to the rails—maintain correct gauge. Track with U·S·S Steel Ties can quickly be laid by workmen using only a hammer and a wrench. All-steel track can easily be moved, taken apart and re-assembled without damage to ties. Light-weight track can be moved in complete sections. U·S·S Steel Ties are available in a complete range of sections—for main haulage track or for roomwork. For frogs, crossings or switches, use U·S·S Lorain Special Trackwork—in standard sizes or specially fabricated.

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The strength of steel makes possible operation of cutting machines at full capacity—as compared with the 60% capacity obtained with the usual 12-foot cuts. These steel beams weigh about one-third as much as a wood slab of equal strength—and their 3⅞" depth allows greater headroom. They cost less in the long run, because they can be used time and again, with a high scrap value when discarded. U·S·S Steel timber provide greater safety, for they will not break — can be straightened, should they bend in service.

SPECIAL STEELS FOR MINE USE

Whatever your problem—abrasion, reduction of weight, corrosion—we will help you get the right steel for that particular problem. U·S·S High Tensile Steels — U·S·S Cor-Ten, *U·S·S* Man-Ten *and U·S·S Abrasion Resisting Steels—are so strong, so tough, so resistant to corrosion, shocks, stress, fatigue, wear and abrasion that by their use, strength and life equal to the best performance of former heavy construction can be obtained with substantially less weight. Call our engineers and find out how little it costs to build and operate with these superior steels.*

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from Illinois coal, a byproduct coke, a West Virginia low-volatile non-smoking coal, and a top-grade Illinois coal. Check is being made for efficiency, firing, burning quality, smoke, and atmospheric pollution from sulphur dioxide. The apparatus being used includes two warm-air furnaces of average home size with forced circulation. The quantity of air entering each furnace is being determined, and the inlet and outlet temperatures are being measured so that the heat put out by each fuel can be computed.

A proposal for a $10,000,000 coal-process-plant to be operated by St. Clair County, Illinois, to prepare Illinois coal into cheap smokeless fuel for the St. Louis market has been branded by former Circuit Judge W. R. Weber as "simply fantastic." The Judge said the State Constitution forbade the Legislature from authorizing the county to vote such a bond issue. The County Board of Supervisors has petitioned for authority to issue such bonds.

•

Battelle Offers Research Study

Battelle Memorial Institute, Columbus, Ohio, announces that further appointments of research associates are to be made. Young men who are university or college graduates and who have shown aptitude for research, either in graduate work or in a brief industrial experience, are eligible. Preference will be given to those who have majored in physics, physical chemistry, organic chemistry, chemical engineering, metallurgy, fuels or ceramics, and especially to those who have completed Ph.D. training and are pointed toward a career in industrial research. The research associates are brought together for a year's experience at Battelle to help bridge the gap between their academic training and their future industrial research work.

Research associates are appointed for one year, including vacation, at a salary of $1,800, which may be extended for a second year. Appointees work full time on approved research projects under supervision of the institute's technical staff, leading to publication of information that will be useful to science and industry. Applications should be submitted not later than May 1 to Clyde E. Williams, director of the institute.

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Ohio River Hydro Development Opposed by Coal Interests

A hearing on the proposal to construct dams on the Ohio River at Letart, W. Va.; Gallipolis, Ohio, and Greenup, Ky., for power purposes was held by the Division Engineer, Board of Engineers, U. S. War Department, on Feb. 27 at Portsmouth, Ohio. Of about 200 in attendance, approximately 80 per cent opposed the project and specifically condemned the proposed hydro-electric development.

Van A. Bittner, president, District 17, United Mine Workers, said the project, if carried out, would force 500 coal miners out of work and mean a loss to the mining industry of 500,000 tons of coal annually. Opposition statements were filed by the National Coal Association, West Virginia and Northern West Virginia coal associations; Kanawha, Logan, Pocahontas, New River, Winding Gulf and Williamson district associations. Ezra Van Horn wired the Board of the opposition of the Ohio Coal Association.

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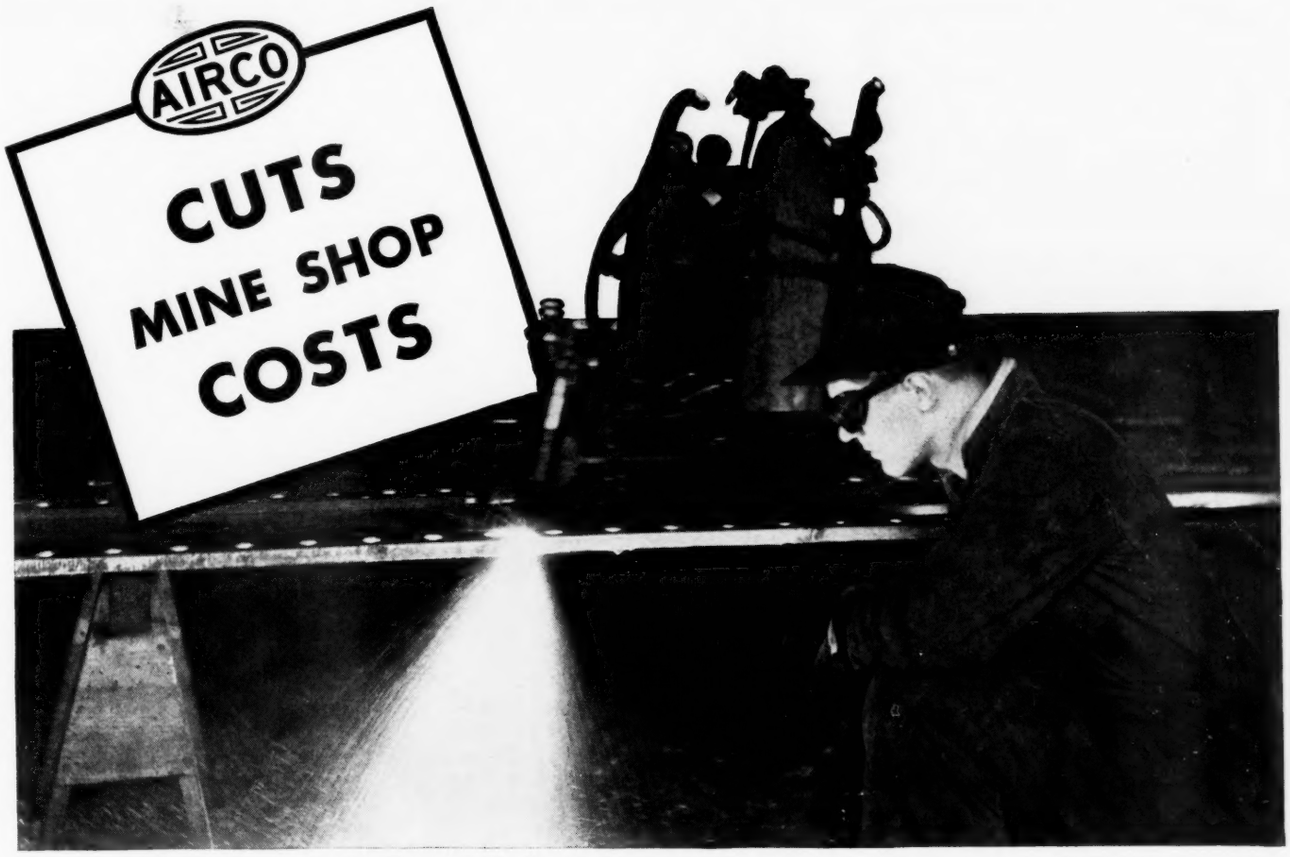
Obituary

DANIEL B. WENTZ, JR., 36, vice-president, Stonega Coke & Coal Co. and Westmoreland Coal Co., operating in Virginia and Pennsylvania, respectively, died March 9 of leukemia at Lankenau Hospital, Philadelphia. He also was an officer in the following distributing organizations: president, Virginia-Kentucky Coal Corporation; vice-president, General Coal Co., Virginia Coal & Iron Co., and Wentz Corporation. He held directorships in the Admiralty Coal Corporation and Crab Orchard Improvement Co.

ARTHUR HALE, 79, chairman of the Coal Exporters' Association of the United States, Washington, D. C., died Feb. 29 in that city of a heart ailment. For many years he had been associated with the Pennsylvania and Baltimore & Ohio railroads and the American Railway Association, subsequently becoming traffic vice-president with the Consolidation Coal Co. and then joining the American Wholesale Coal Association, which has since changed its name to the American Coal Distributors' Association. Under the National Recovery Administration he was secretary of the Wholesale



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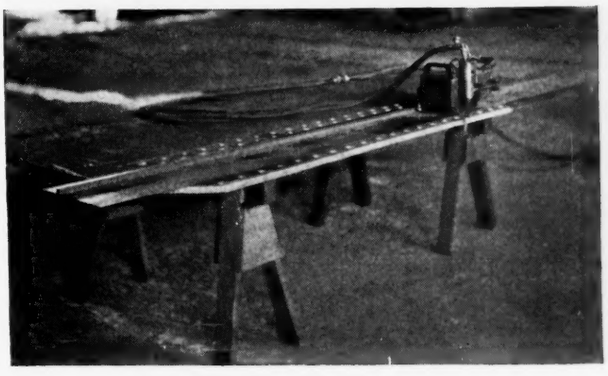
The speed and accuracy with which the portable, lightweight No. 1 Tractograph performs its job has materially helped in the reduction of one of the major problems of the coal industry — the out-of-service time of mine cars.

By using the side roller attachment, this lightweight, portable machine automatically makes its cut, and can be moved from job-to-job without loss of time. If your problem is one of cutting for production or maintenance, Airco engineers have designed and perfected the right cutting machine to do the job the quickest and most economical way. Consult us on your cutting problems.



No. 1 Tractograph is shown here, using the side roller attachment. This lightweight machine clearly illustrates its portability—can be taken from one job to another quickly.

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April 29 to May 3

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Coal Authority. He was a son of Edward Everett Hale, noted New England clergyman and author.

THOMAS F. SLATTERY, 68, anthracite operator, died Feb. 22 in Misericordia Hospital, Philadelphia, Pa., following a fall. He was president of the Bell Colliery Co., Tuscarora, and the Frackville Coal Co., Cumbola, Pa., as well as Slattery Bros., Inc., a distributing organization in Philadelphia.

J. S. HAMMONDS, 67, former district superintendent and more recently inspector of operations for the Lehigh Valley Coal Co., died Feb. 22 at his home in Kingston, Pa. He had been in the employ of the Lehigh Valley company for more than half a century in various capacities.

SAMUEL GILLILAN, 49, mine foreman at "D" mine of the Union Pacific Coal Co., Superior, Wyo., was fatally shot Feb. 21 when his rifle accidentally discharged while target shooting with one of his sons.

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Dustless Treatment Study Launched at Armour

An extensive program of research on the dustless treatment of United States coals is being launched by the Research Foundation of Armour Institute of Technology, Chicago, according to an announcement by Harold Vagtborg, director. This is one of several programs carried on by the foundation in the study of coals, their uses and possible treatment for better and more efficient utilization; a little less than a year ago it pioneered in the use of coals in liquid form to run a standard-make automobile.

According to Mr. Vagtborg, the foundation has been conducting preliminary work in the study of dustless coal treatment during the last year, under the supervision of Dr. F. W. Godwin, director of chemical engineering research, laying the groundwork for the present program. The program is aimed at making available to the householder at a low cost coal which will not deposit dust; coal which, in other words, can be delivered to the home without soiling the wash on the line. Undertaken through the cooperation of the Johnson March Corporation, of New York, the investigation will be made in the foundation coal laboratories and also in the field. Dr. Martin H. Heeren, staff member of the foundation chemical engineering division, will conduct the study.

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Joy, Dorr and Brown Honored

Special awards as "modern pioneers" were bestowed by the National Association of Manufacturers in February in connection with the observance of the 150th anniversary of establishment of the U. S. Patent Office. A committee of distinguished scientists headed by Dr. Karl T. Compton, president, Massachusetts Institute of Technology, selected 500 persons to be so honored, among whom were J. F. Joy, president, Joy Mfg. Co., who has been responsible for nearly 100 United States and foreign patents, mostly improvements in coal-mining machinery; J. V. N. Dorr, mine- and metal-equipment engineer and manufacturer; and W. E. Brown, Ventube sales representative for E. I. du Pont de Nemours & Co., Inc., in recognition of his patents covering improvements in coating, suspensions and couplings for collapsible acid-resisting tubing used in auxiliary mine ventilation.

Designation of these men is the culmination of more than six months' search by the committee for men whose pioneering on the frontiers of industry has resulted in increasing employment, providing a new commodity or service, reducing the cost of a product already in use, or improving the quality of a product already in use.

•

Soft-Coal Automatic Heat Drive Planned for Nashville

A promotion program for automatic heat with bituminous coal is planned for Nashville, Tenn., with coal and stoker dealers joining hands in the drive. Support of distributors of coal burners, stokers and heating equipment is being sought by a committee appointed by stoker dealers and the Nashville Wholesale Coal Association and the Nashville Retail Coal Merchants' Association which is studying plans for a coal and stoker show. A representative of Nashville Electric Service is serving on the committee. T. A. Day, southeastern manager for Appalachian Coals, Inc., has agreed to act as coordinator.

Sanction and support for the proposed exposition have been extended by City Smoke Inspector Culbert. A site for the show and other preliminaries are being studied by subcommittees. The show committee includes the following: T. C. Young and Thomas Lamb for the wholesalers; Manuel Frank and Benjamin Doubleday for the retailers; and Frank Bogle, H. M. Saurie, James M. Hudgins and Allen Walker for the stoker dealers, and A. C. Gibson for Nashville Electric Service.

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Missouri Conference Set

A Missouri Mineral Industries Conference will be held April 26 and 27 at the Missouri School of Mines and Metallurgy, Rolla, Mo. With a supper on the evening of the first day there will be an open joint meeting of the St. Louis and Tri-State (Joplin) sections of the American Institute of Mining and Metallurgical Engineers with the Missouri School of Mines Student Chapter of the institute. The principal speaker will be R. C. Allen, past president of the A.I.M.E.

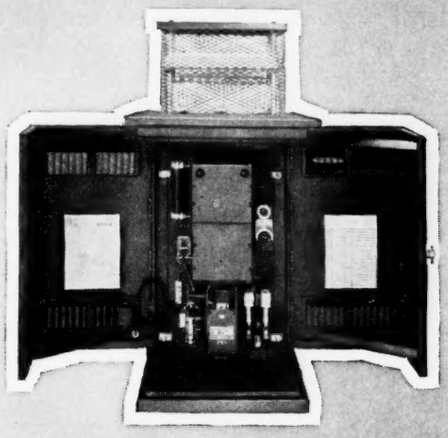
•

Miner-Boxers Seek Opponents

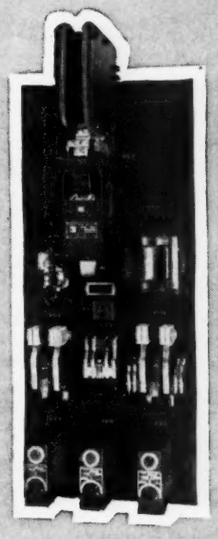
An eight-man boxing team sponsored by Van B. Stith, preparation and safety manager, Anchor Coal Co., Highcoal, W. Va., and Deputy Boxing Commissioner of West Virginia, seeks opponents for the eight bouts that will feature athletic night, April 30, in connection with the American Mining Congress convention at Cincinnati, Ohio.

NEWS for you at Booth 425

I-T-E PRESENTS New Electrical Protection for Mines



The Type KSC automatic reclosing circuit breaker is available in a complete new design. The circuit breaker which has been dominant in mining applications is now more widely useful.



The most universally used automatic reclosing sub-station circuit breaker now incorporates new refinements among which is a new high speed reverse current relay with wider range of calibrated adjustment.

For better paralleling of motor-generator sets I-T-E has pioneered with the Load Distributor.

Type KWB, an inexpensive manually operated circuit breaker for use in underground applications, is convertible when desired to full automatic reclosing.

OTHER I-T-E DEVELOPMENTS

A manually operated circuit breaker, actuated by thermal conditions, for the protection of 4/0 and 6/0 trolley wires.

Full automatic switchboards for motor-generator sets.

Full automatic switchboards for rotary converters.

I-T-E

Representatives in Principal Mining Areas

I-T-E CIRCUIT BREAKER CO., PHILADELPHIA, PA.

Mr. Stith, who is chairman of the subcommittee arranging the fisticuffs, invites amateur boxers employed by coal-mining companies to enter, with the assurance that they will be fairly matched. Expenses of participants selected will be paid, applications to be mailed to Richard J. Lund, editor, *Mining Congress Journal,* Munsey Building, Washington, D. C.

•

New Company to Mine Coal In West Virginia

A new coal mining company, the Snap Creek Coal Co., has been organized to operate 1,000 leased acres near Logan, W. Va. Cincinnati (Ohio) and Huntington (W. Va.) interests are associated in the undertaking. Officers are J. H. Rhodes, president; A. J. Russell, vice-president, and E. J. Payne, vice-president in charge of operations.

The mine is to be fully mechanized, will work the Alma seam and is to have an annual output of about 200,000 tons, according to Mr. Payne. Construction is to begin soon so that production can get under way as early as possible.

•

Lehigh Meeting Plans Shaping

Plans are rapidly approaching completion for the Third Annual Anthracite Conference, to be Held May 9 and 10 at Packard Laboratory, Lehigh University, Bethlehem, Pa. Papers on a variety of interesting subjects by authorities in their respective lines are being prepared. Some of the important subjects to be covered are: "Proper Use of Domestic Sizes of Anthracite in Home Heating," "Modern Methods for Handling Coal and Ash," "Practical Results From the Use of Anthracite on Semi-Industrial Stokers," "Important New Data and Research on Chimneys and Draft," "Reducing the Cost of Manufacturing Anthracite Equipment Through Industrial Standardization," "Mining and Combustion Engineering as an Opportunity for the Young Engineer," "Mineral Wool Insulation From Anthracite Ash and Anthracite Culm Banks" and "Application of Anthracite to Modern Baking Ovens."

•

House Group Studies Mine Bills

Consideration of mine inspection bills began in the House of Representatives at Washington on March 7, when the Committee on Mines and Mining of the House met. After lengthy discussion in executive session a subcommittee was named to go into the subject thoroughly and decide what methods to pursue and to hold hearings. The subcommittee named includes: Andrew L. Somers (D., N. Y.), J. Hardin Peterson (D., Fla.), Fadjo Cravens (D., Ark.), Fred Bradley (R., Mich.) and Thomas D. Winter (R., Kan.). The chairman has indicated that he desires to make a real study of coal-mine operations so as to be better informed on the subject before hearings are held. The cooperation of the industry has been extended to the committee in the work.

•

Homes Sink Over Mine Workings

An 11-acre section of the town of Shenandoah, Pa., began to sink in the early morning of March 4, causing scores of homes and buildings to twist and crack. Though there have been anthracite mines beneath the structures for a number of years, the reason for the cave-in occurring when it did is a matter of conjecture. In some places the subsidence was as great as 22 in.

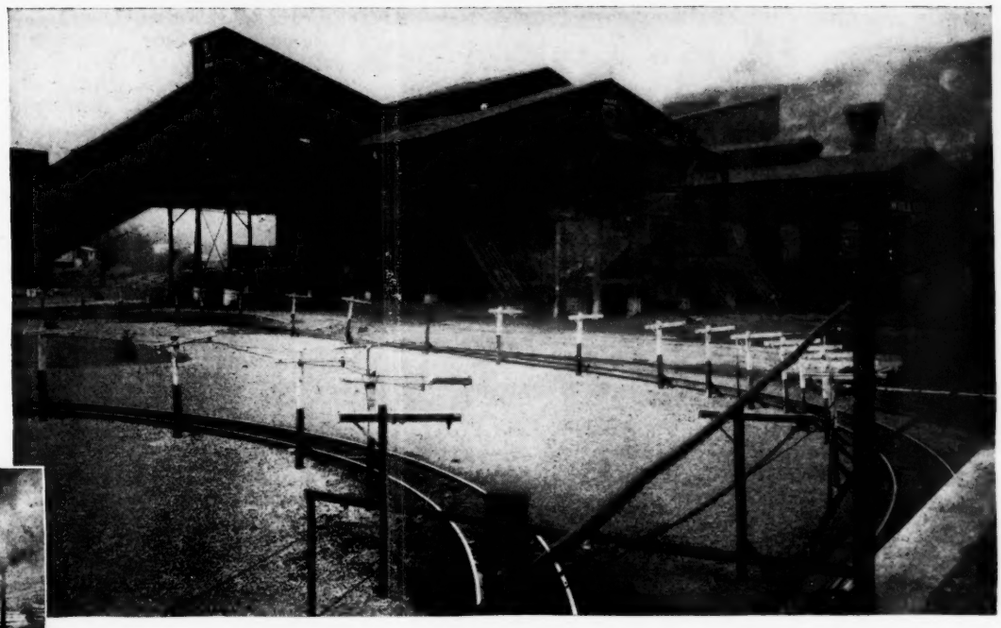
•

Industrial Notes

ROBERTS & SCHAEFER CO. announces the removal of its offices from the Wrigley Building to 307 North Michigan Ave., Chicago.

GEORGE A. SMITH, assistant plant manager of the Meriden (Conn.) factory of the New Departure Division, General Motors Corporation, has been appointed assistant general manager of the Hydra-Matic Transmission Division of General Motors, Detroit, Mich. He joined New Departure in 1920.

CHAIN BELT CO., Milwaukee, Wis., has elected J. C. Merwin to the office of treasurer in addition to that of vice-president,



HAUL *Heavier Loads at Higher Speeds* OVER WELDED TRACK!

- Operating speeds can be stepped up and heavier loads can be hauled when rails are Thermit welded. Elimination of rough riding, battered rail joints and transformation of rails into long, continuous ribbons of steel reduces danger of derailment; makes trains roll easier.

  In addition, reduction of power losses, effected by doing away with rail bonds and substituting fully conductive welds, gives locomotives extra power.

  Write for pamphlets outlining all of the savings you can make by installing welded main haulage track and describing the Thermit process of rail welding. Or, ask to have a representative call and explain. No obligation, of course.

THERMIT Rail WELDING

METAL & THERMIT CORPORATION • 120 BROADWAY, NEW YORK
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For better results in electric arc welding, investigate MUREX line of HEAVY COATED ELECTRODES including especially designed rods for building up and hard surfacing.

which he already held. L. B. McKnight has been appointed assistant to the vice-president, but will continue as sales manager of the company's conveyor division.

FALK CORPORATION, Milwaukee, Wis., announces that Herman W. Falk, founder of the company and president since its inception, has been made chairman of the board. He has been succeeded as president by Harold S. Falk.

WORTHINGTON PUMP & MACHINERY CORPORATION, Harrison, N. J., has elected H. A. Feldbush as a vice-president. He joined the company in 1915 and has lately been general manager of the Carbondale Division.

ALLIS-CHALMERS MFG. CO. has appointed Walter L. Maxson as sales manager and chief engineer of its mining machinery division, moving him up from sales engineer. William C. Johnson, until recently manager of the company's Knoxville (Tenn.) district sales office, has been made sales manager of the crushing and cement machinery division.

BABCOCK & WILCOX TUBE CO., Beaver Falls, Pa., has named Joe S. Thompson as district sales manager of its Chicago office. Joining the company in 1934, Mr. Thompson was transferred to Chicago as a salesman in 1937.

SIMPLEX WIRE & CABLE CO., Cambridge, Mass., has appointed G. F. Doughty as manager of its New York sales office, with which he has been associated for the last seventeen years.

TEMPLETON, KENLY & CO., Chicago, manufacturer of jacks and equipment, has elected J. B. Templeton president. He moves up from vice-president, succeeding W. B. Templeton, who is now chairman of the board.

HAYS CORPORATION, Michigan City, Ind., manufacturer of combustion instruments and automatic combustion control, has appointed Charles M. Chapman, Cincinnati, as representative for southern Ohio and contiguous territory in Kentucky and Indiana.

LINK-BELT CO., Stoker Division, has appointed the Georgia Power Co., Atlanta, Ga., as retail dealer in its stokers in that territory.

●

Power Conference to Study Coal

A diversified program has been arranged for the Third Annual Midwest Power Conference, to be held April 9 and 10 in the Palmer House, Chicago. Sponsored by Armour Institute of Technology, in cooperation with seven Midwestern universities and colleges and several local and national engineering societies, the conference is designed in the main as a clinic for the discussion of power production, transmission and consumption.

A section devoted to fuel problems of power plants, expected to be of interest to coal men, includes the following papers: "Stratification of Gases in Coal-Fired Furnaces," John M. Drabelle, Iowa Electric Light & Power Co.; "Pulverized Coal," Martin Frisch, chief engineer, boiler and pulverizer division, Foster Wheeler Corporation; "The Intermittent Burning of Gas and Pulverized Coal," H. A. Kleinman, Peoples Power Co., Moline, Ill.

●

Plan Smokeless Fuel Plant

Construction of a plant to produce smokeless fuel from coal screenings is planned for Louisville, Ky., according to Curtis C. Webb, director of the city Research and Service Department. An Illinois plant producing fuel designed to meet St. Louis (Mo.) smoke-elimination plans is under consideration as a model, said Mr. Webb.

●

Doubles Stoker-Coal Equipment

Old Ben Coal Corporation has doubled the capacity for producing household stoker coal at its No. 14 mine, Buckner, Ill., with the installation of another American Coal Cleaning unit. Demand for this product having overstepped the natural supply, 3-in. and under are being crushed to meet requirements.

●

Diamond Chain 50 Years Old

Founded in 1890, the Diamond Chain & Mfg. Co., Indianapolis, Ind., is celebrating its fiftieth anniversary. In its long career of "doing one job well" the company has played an active role in effecting improvements in roller chain—particularly since the introduction of alloy steels—to increase wear resistance and accuracy.

●

Logan-Chilton Tipple Burns

Fire of undetermined origin destroyed the tipple of the Logan-Chilton Coal Co., Rita, W. Va., late in February. About 60 men were thrown out of work. The unofficially estimated loss of $50,000 brought to more than half a million dollars the fire losses in Logan County in a little more than a month.

●

Trade Literature

BREAKER PANELBOARDS — Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Catalog Section 29-460 describes Nofuze De-ion units, citing their characteristics and conveniences.

COAL-MINE EQUIPMENT — Sullivan Machinery Co., Michigan City, Ind. Bulletin 50C covers the full Sullivan line of equipment for coal mines, including various types of coal cutters for kerf thicknesses from 2½ to 6 in.; track cutters, dual-duty machines for either shortwall or longwall operation, two-speed power trucks, room

R & P CLEANS COAL THE R&S WAY..

★ Cleaning plant showing loading terminal and belt conveyor from revolving dump, approximately 1000 feet away.

New Tipple and Air Cleaning plant of Rochester and Pittsburgh Coal Co. of Indiana, Pa., at Waterman Mine, Homer City, Pa. Capacity of tipple 300 tons R. O. M. per hour. Capacity of stump air cleaning plant 125 tons per hour. Cleaning 3/4x0 slack — loading 3/4x1/4 and 1/4x0 coals.

SEE US AT CINCINNATI
BOOTHS 610–12–14

★ Tipple houses R&S Revolving Dump—Sizing Screen, and Bradford Breaker.

• **Some large tonnage users of the Stump Process are:**

Bell and Zoller Coal Mining Company	Ziegler, Ill.
Berwind-White Coal Mining Company	St. Michael, Pa.
Heisley Coal Company	Nanty Glo, Pa.
Island Creek Coal Company	Holden, W. Va.
Monroe Coal Mining Company	Revloc, Pa.
Pickands Mather and Company	Mather, Pa.
Pittsburgh Coal Company	Negley, Ohio
Westmoreland Mining Company	Blairsville, Pa.

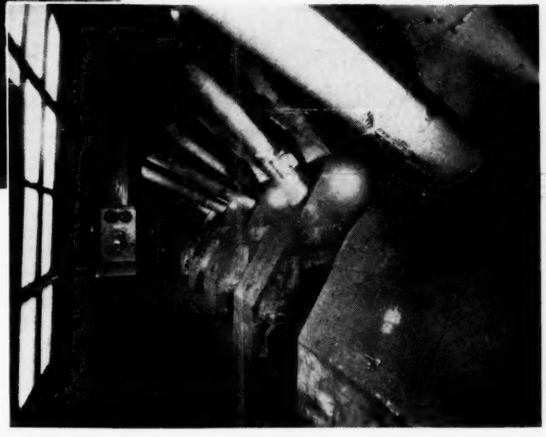
• ***Of all air cleaning plants built during the last five years ninety per cent have employed the Stump Process***

Whatever your preparation needs may be, our engineers can find the proper answer.

We invite your inquiry and place at your disposal our consulting service, testing plant and laboratory.

Write for Bulletin No. 153.

★ R&S Revolving Dump—Capacity of mine car ten tons.



★ (right) Cleaning floor showing R&S Stump air flow units.

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types to suit requirements
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DEDUSTING PLANTS
REVOLVING DUMPS
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Authoritative Valuations and Reports of Mining Properties, Equipment and Operation.
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Private records covering 40 years of professional activity in coal fields of United States and Canada.
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Profitable Mine Operation—

calls for operating efficiency all along the line. These specialists in various phases of mine operation can aid you materially in determining quick, economical solutions to your mining problems, that make for more efficient operation, resulting in lower costs and a consequent greater return on your investment. Consult them!

hoists, car pullers, scraper haulers, rock loaders; portable, semi-portable and stationary compressors, mine-car compressors, rock drills, stopers, stripborers, channel cutters, cutter-bit heaters and sharpeners, and miscellaneous accessories.

COMPRESSORS—Worthington Pump & Machinery Corporation, Harrison, N. J. Bulletin H-620-B22 describes and pictures Types VA and VA2 balanced-angle two-cylinder units, stressing advanced design and other features. Bulletin H-850 covers the Model 105 streamlined portable unit.

CROSS-DRUM BOILER—Babcock & Wilcox Co., New York City. Bulletin No. G-23 describes the Design 32 unit, a straight-tube sectional-header boiler for pressures of 250 lb. or less and with heating surface of 1,000-6,000 sq.ft. In addition to stressing advantages of this boiler the text discusses the effect of its design in relation to useful life, tube replacement, inventory of spare tubes, etc.

DRILLS—Worthington Pump & Machinery Corporation, Harrison, N. J. Bulletin H-1200-B27 cites advantages of the No. 180 pneumatic-feed drifter. Bulletin H-1200-M6 sets forth the characteristics of the Model UPW Rock Master.

DUSTLESS TREATMENT — Johnson-March Corporation, New York City. Booklet sets forth the advantages of Coalaid and Coaladd in providing "effective dust treatment" for coal—by which is meant turning out a product free from approximately 95 per cent of the dust ordinarily observable in untreated coal of the same characteristics.

EARTH-MOVING EQUIPMENT — R. G. LeTourneau, Inc., Peoria, Ill. General catalog pictures and describes the company's entire line and services, including bulldozers, Angledozers, Rooters, Carryall scrapers, Sheep's Foot rollers, Pushdozers, Treedozers and tractor cranes. Information also is given about Tournacar welding service.

FRAME HEADS — General Electric Co., Schenectady, N. Y. Bulletin GEA-2642A tells "what improved frame heads for mine and industrial-haulage locomotives mean in lower maintenance and longer life."

LIMIT SWITCHES—Micro Switch Corporation, Freeport, Ill. Data Sheet No. 8 explains the advantages of Type LK interchangeable precision units, setting forth features, characteristics and specifications.

MASS-FLOW CONVEYORS — Jeffrey Mfg. Co., Columbus, Ohio. Catalog 730 depicts in word and picture typical arrangements, construction, operation, dimensions and working values of the Mass-Flo unit. Many advantages are stressed, together with a long list of materials that can be handled.

MINING ROPES—American Cable Division, American Chain & Cable Co., Inc., Wilkes-Barre, Pa. Folder shows Tru-Lay preformed lines at work, with accompanying text giving recommendations for the men who have to select wire lines for particular purposes or applications. Included

Fiberglas Electrical Insulation Can Take Overloads, Add to Life of Motors and Generators!

YES, IT'S TRUE. Today you can get motors and generators that cheerfully stand severe overloads. You can put these motors and generators to work on tough jobs and find in many cases they last from *three to five times* longer. You'll be surprised the money they save for you in lower up-keep . . . fewer hours lost in "down-time".

How can all this be? Very simple. These motors are made with Fiberglas Insulation. This insulation is made with *pure glass in fibrous form*. These fibers have resisted *heat* as high as 1000° F. They are not harmed by excessive *moisture*. And they are more stable in the face of most chemical *corrosion* than copper or iron. So here's what happens, for instance, because of their ability to withstand heat:

When motors labor under sudden overloads . . . heat up beyond the point where other insulations burn out . . . *Fiberglas Insulation can stand the added heat.*

When motors have to work in high ambient temperatures . . . under conditions which break down the best insulation formerly available . . . *Fiberglas Insulation can stand the added heat.*

It's truly astounding—the ability of Fiberglas Insulated equipment to keep going under tough conditions. And every day we get new reports of how this wonder-working insulation is helping to lick many of the toughest motor problems of American industry.

Seeing Is Believing

We advise people not to take any manufacturer's unsupported claim at face value. Not when it's simple and inexpensive to make a test and get real *proof*. Here's how you can do it:

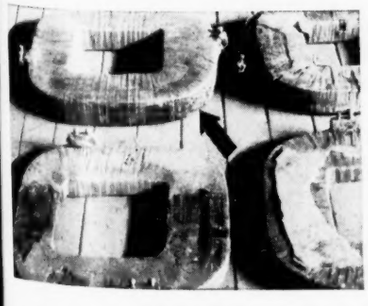
Next time you have a repair job, or next time you need a piece of *new* electrical equipment, specify Fiberglas Insulation throughout. Choose it for the toughest job you have. Then try it out. The *facts* will tell you whether or not it's good business to: Standardize on Fiberglas Electrical Insulation. Write Owens-Corning Fiberglas, Toledo, Ohio. In Canada: Fiberglas Canada, Limited, Oshawa, Ontario.

OWENS-CORNING

FIBERGLAS*

*T. M. Reg. U.S. Pat. Off.

Mining Company Makes Test in Field to Prove Fiberglas Insulation



THE PROBLEM: Mining Company uses 13-ton locomotives to haul forty 2-ton cars up a 3% grade. Faced with frequent repairs and crippling loss of equipment when low voltage overloads field coils. Can this be avoided?

THE ANSWER: Superintendent decides to make a test. Has four field coils rewound—one with Fiberglas Insulation, other three with another type of class B insulation. After severe test in service all four coils were removed and only the Fiberglas Insulated coil remained undamaged.

MORAL: A motor or generator is only as good as its insulation. Be sure to specify Fiberglas Electrical Insulation. "Ask your Electrical Manufacturer or Repair Shop."

prices of ropes most commonly used in mining.

SAFETY SWITCHES — Trumbull Electric Mfg. Co., Plainville, Conn. Circular No. 315 describes six different types of inclosures for safety switches, motor starters, circuit breakers and service equipment for special applications in various locations where dust or volatile fumes are prevalent.

THRUSTOR-OPERATED VALVES — General Electric Co., Schenectady, N. Y. Bulletin GEA-1569B lists salient features of CR9507-L units for pipe sizes of 1 to 10 in.

TRACTOR—Allis-Chalmers Mfg. Co., Milwaukee, Wis. Catalog Form MS-248 describes revolutionary features of the A-C HD14 diesel unit, including reduced maintenance costs with bimetallic steering clutches and brakes, and new truck wheels with 200-hour lubricating interval.

TRACTORS—Caterpillar Tractor Co., Peoria, Ill. Catalog Form 5856 stresses the on-the-job qualities of Caterpillar diesels, illustrations showing them at work all over the world.

•

Ohio Mine Blast Kills 73

Four men died and 69 were entombed shortly after 11 a.m. March 16, when an explosion occurred in the Willow Grove mine of the Hanna Coal Co., Neffs, Ohio. More than 100 others, many suffering from gas fumes and injuries, escaped. Among the dead are John H. Richards, mine superintendent, and Howard Sanders, tipple foreman, who perished in an attempt to rescue those entombed. Hope of finding any of the 69 imprisoned miners alive was abandoned on March 18, when some of the bodies of those trapped were recovered. The cause of the disaster had not been determined at that time.

•

Coal Company in New Office

The American Coal Co. of Allegany County has moved its New York office from 1 Broadway to the R. C. A. Building, Rockefeller Center.

•

Accident Fatality Rate Higher For Soft Coal; Dips for Hard

Accidents at coal mines of the United States caused the deaths of 182 bituminous and 16 anthracite miners in January last, according to reports furnished the U. S. Bureau of Mines by State mine inspectors. With a production of 46,155,000 tons, the accident death rate among bituminous miners was 3.94 per million tons, compared with 1.83 in the corresponding month of last year.

The anthracite fatality rate in January was 2.84, based on an output of 5,631,000 tons, against 5.95 in January, 1939.

Fatalities during January last, by causes and States, as well as comparable rates for the first month of 1939 and 1940, are shown below:

UNITED STATES COAL-MINE FATALITIES IN JANUARY 1940, BY CAUSES AND STATES

State	Underground: Falls of Roof	Falls of Face	Haulage	Gas or Dust Explosions	Explosives	Electricity	Machinery	Other Causes	Total Underground	Open-cut and Surface: Railway Cars	Falls of Persons	Other Causes	Total Surface	Grand Total
Alabama	3	...	2	...	...	...	...	...	4	...	...	...	...	4
Colorado	3	2	1	...	...	...	...	...	6	...	...	...	...	6
Illinois	5	...	1	1	...	...	...	...	7	1	...	...	1	8
Indiana	...	...	...	...	1	...	...	1	2	...	...	...	...	2
Iowa	3	...	...	...	...	...	...	...	3	...	...	...	...	3
Kansas	...	...	...	...	1	...	...	1	2	...	...	...	...	2
Kentucky	8	1	...	...	...	1	...	1	11	...	...	...	...	11
Missouri	2	...	...	...	...	...	...	...	2	...	...	...	...	2
New Mexico	2	...	...	...	...	...	...	...	2	...	...	...	...	2
Ohio	3	...	1	...	...	...	...	...	4	...	...	1	1	5
Oklahoma	...	...	...	2	...	...	...	...	2	...	...	...	...	2
Pennsylvania (bit.)	6	...	1	...	...	...	1	...	8	...	1	1	2	10
Utah	...	1	...	...	...	...	...	...	1	...	...	...	...	1
Virginia	3	...	...	...	...	...	1	...	4	...	...	...	...	4
West Virginia	13	...	9	91	1	1	1	...	116	2	...	...	2	118
Wyoming	1	...	1	...	...	...	...	...	2	...	...	...	...	2
Total (bituminous)	51	4	16	94	3	2	3	3	176	3	1	2	6	182
Pennsylvania (anthracite)	9	...	6	...	1	...	...	...	16	...	...	...	...	16
Grand total	60	4	22	94	4	2	3	3	192	3	1	2	6	198

FATALITIES AND DEATH RATES AT UNITED STATES COAL MINES, BY CAUSES*

January, 1939 and 1940

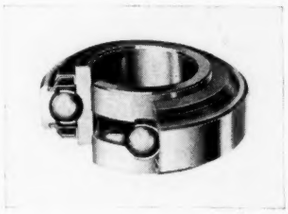
Cause	Bituminous: Number Killed 1939	1940	Killed per Million Tons 1939	1940	Anthracite: Number Killed 1939	1940	Killed per Million Tons 1939	1940	Total: Number Killed 1939	1940	Killed per Million Tons 1939	1940
Underground:												
Falls of roof and coal	36	55	1.012	1.192	17	9	3.487	1.598	53	64	1.311	1.236
Haulage	12	16	.337	.347	2	6	.410	1.065	14	22	.346	.425
Gas or dust explosions:												
Local	2	3	.057	.065	...	...	.....	.....	2	3	.049	.058
Major	...	91	.....	1.971	...	...	.....	.....	...	91	.....	1.757
Explosives	...	3	.....	.065	5	1	1.026	.178	5	4	.124	.077
Electricity	6	2	.169	.043	...	...	.....	.....	6	2	.149	.039
Machinery	4	3	.112	.065	...	...	.....	.....	4	3	.099	.058
Shaft	1	...	.028	.....	1	...	.205	.....	2	...	.049	.....
Miscellaneous	1	3	.028	.065	1	...	.205	.....	2	3	.049	.058
Stripping or open-cut	1	...	.028	.....	...	...	.....	.....	1	...	.024	.....
Surface	2	6	.057	.130	3	...	.616	.....	5	6	.124	.115
Total	65	182	1.828	3.943	29	16	5.949	2.841	94	198	2.324	3.823

*All figures subject to revision.

WHAT'S NEW IN COAL-MINING EQUIPMENT

BEARING SEAL

A new ball-bearing seal known as "Mechani-Seal" is offered by the Fafnir Bearing Co., New Britain, Conn. The new development in bearing closures is designed to effect high sealing efficiency without the disadvantages of conventional felt seal or other contact material that would cause friction and heat.



Two steel plate shields, widely separated to form a trap, serve as the innermost members, both attached to the outer bearing ring. Another steel plate, pressed on the bearing inner ring, acts as a slinger when this inner ring is rotating. Definite though extremely close clearances exist between the individual members so that nothing is added to the total bearing friction. The outer members, in addition, are given a corrosion- and rust-proof treatment. The new design is obtainable in single-seal, double-seal, seal and shield combinations, on either the Fafnir radial or wide inner-ring bearings.

•

MEASURING LUBRICATOR

A new system for lubricating small machines or a few bearings on larger machines from a single grease inlet has been developed by the Farval Corporation, Cleveland, Ohio. This new unit, the DX multiple measuring valve, combines a single inlet port with two to eight outlets per block. As many valve blocks as may be needed to lubricate all bearings on a machine can be installed and connected in series.

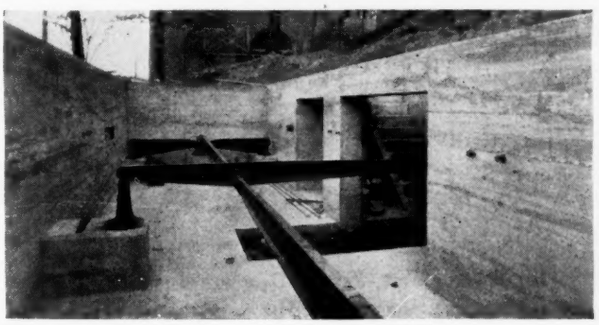
By connecting a conventional type of hand or power grease gun to the grease nipple at the inlet port each bearing gets positive pressure lubrication. In one position of the rotary valve handle at right-hand side of block, the valve pistons are moved by pressure built up by the gun, delivering lubricant to bearings through one set of valve outlets; turning the valve handle in the opposite direction causes lubricant pressure to move the valve pistons in the opposite direction to deliver lubricant to the other set of outlets. Movement of the telltale indicator stem attached to each valve piston shows that each bearing has received its measured quantity of lubricant.

•

TRUCK SCALES

Three complete lines of motor-truck scales, comprising 128 different styles with weighing capacities up to 70,000 lb., are announced by the Toledo Scale Co., Toledo, Ohio, for 1940. The three lines are: (1) Toledo-A.R.E.A. scales, engineered to the rigid specifications sponsored by the American Railway Engineers' Association, 40 regular styles, capacity to 70,000 lb.; (2) "Truck-masters"—designed for installation where usage is less severe, 48 styles, capacities up to 65,000 lb.; (3) "Truckweigh" beam-type commercial scales, 40 styles, capacities up to 61,000 lb. Models will cover a full range of lever sizes for platforms up to 40x10 ft. They also will offer a complete selection of weight-indicating methods — automatic dial, beam, type-registering beam, beam indicator and printweigh ticket-printer.

The Toledo company will handle each installation completely from factory to user. Much attention has been given to truck scales in recent years by such groups as the A.R.E.A. and the National Bureau of Standards. The testing done on over 1,500 scales by the Bureau resulted in publication of a report and a leaflet on the installation and maintenance of such scales. Reprints of these documents are featured as part of the material being supplied to its national field force by the Toledo company.



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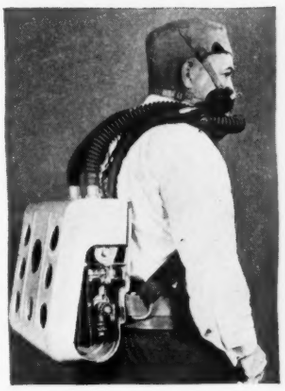
ALUMINUM PAINT

Skybryte Co., Cleveland, Ohio, has announced a new ready-mixed aluminum paint, "Fence-Bond," specially formulated for painting rusted chain-link fence without removing the rust. Base oils of the penetrating type creep into all joints and contact points, sealing the rust against further corrosive action. It is said to dry from the outside, retaining a firm elasticity able to withstand the movement of the joints without chipping. The pigment, Alcoa Albron paste, is mixed at the factory under controlled conditions to insure better dispersion of the metal particles, resulting in a durable finish. The paint may be applied with brushes or spray gun.

•

BREATHING APPARATUS, BACK-TYPE

A new development in oxygen breathing apparatus—a one-hour back-type model—is announced by Mine Safety Appliances Co., Pittsburgh, Pa. Employing the same principles of operation as the front-type model, the new model is said to supply protection for an equal period but differs in cover and harness arrangement,



being carried on the wearer's back by comfortable wide-web straps and protected by strongly reinforced aluminum cover which effectively guards the working parts. Furnished in either mouthpiece (approved by the U. S. Bureau of Mines) or full facepiece types, this new model is designed for service where special conditions require work in prone or stooping positions. The new apparatus weighs only 24 lb. complete.

•

ELECTRIC ARC WELDER

A new single-operator motor-operated arc welder, requiring only one control device for operation, is offered by Wilson Welder & Metals Co., Inc., New York City. Known as the Wilson "Hornet," this machine employs for its control a single simple handwheel located on top of the

unit which can be adjusted to permit the operator to obtain an infinite number of current settings.

The "Hornet" is a two-bearing unit with motor rotor and generator armature mounted on a common shaft. Adequate ventila-

tion is furnished by propeller blades attached to the revolving shaft. Although shielded arc electrodes are recommended, it will operate with equal efficiency where bare electrodes are used. There are three sizes: 200-, 300- and 400-amp.

•

FACE SHIELD

Boyer-Campbell Co., Detroit, Mich., offers a face shield embodying three types in one. It is made practical by the interchangeability of screens, easily buttoned onto the spark deflector, a fiber forehead guard with a sweatband of leather, backed by felt. Fitted with "Plastacele" window, it is said to be suitable for spot, flash and gun welding, buffing, polishing, wire brushing,

etc.; with "wire-screen" window, it can be used for babbitting, heat protection, etc., and with "fiber-front" and "glass-holder" it gives complete protection for acetylene welding, burning, scarfing, etc. "Plastacele" windows are aluminium-bound to permit individual fitting and offer equal protection with or without correction glasses. When not in use the window can be tilted upward, giving protection from overhead glare.

•

BALL BEARING

Norma-Hoffmann Bearings Corporation, Stamford, Conn., announces two new series of "extra-light" ball bearings. They are said to meet the demands of manufacturers when minimum weight is desired, center distances are restricted, and where designers are cramped for space. It is noted that a larger diameter shaft is permitted with a given diameter housing and a smaller diameter housing with a given diameter shaft. They are furnished with single felt seal, "6000"; felt seal and side plate or shield, "6000-P"; without side plate or shield, "6100"; with one side plate, "6100-P"; and with two side plates, "6100-PP." The sealing devices, being wholly within the bearings, are not exposed to injury, and the felt seals, firmly held in the grooves of the outer ring, are removable. Housing inserts are unnecessary because of the wide solid inner and outer rings.

CHAIN VISE

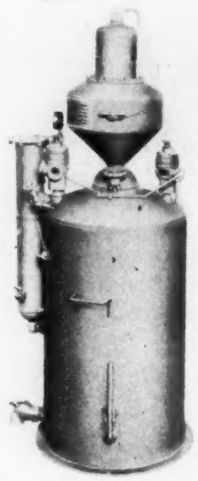
Whitney Chain & Mfg. Co., Hartford, Conn., has announced a new universal chain vise, developed to simplify the disassembly of roller chains in pitches from ⅝ to 2½ in., and in single and many multiple widths. It is said to be light weight; portable; one-man, one-hand operated, and after closing both hands are free;

is a complete self-contained unit, self-closing and self-adjusting; may be used without removing chain from drive; obviates distortion or chain tilting; and can be used for riveting new links in place. Rivet heads are sheared off, eliminating any preliminary grinding.

•

PORTABLE ACETYLENE GENERATOR

The Oxweld MP-9 medium-pressure acetylene generator, designed to combine portability with the operating advantages usually found only in larger units, has been announced by the Linde Air Products Co., New York City. It is constructed of steel (steel welded), weighs 129 lb., holds 25 lb. of size 14 ND Union carbide,



and is said to deliver as much as 50 cu.ft. of acetylene per hour at any pressure up to 15 lb. per square inch, permitting several hours of continuous welding or cutting from one charging on all except the heaviest work. Operation is simple, since one handle is used to start or stop generation and to adjust delivery pressure. Once started, operation is fully automatic.

•

EXCAVATOR

A new excavator said to offer the rugged strength of the larger heavy-duty quarry and mining machines combined with the speedlined design and mobility found as a rule only in machines of smaller capacities is now being offered by Bucyrus-Erie Co., South Milwaukee, Wis. It is the 2½-yd. 54-B, a diesel-powered convertible shovel, dragline, clamshell, lifting crane.

With husky quarry-type boom, wide outside dipper sticks, modern welded heavy-duty dipper, and positive independent crowd, the machine is so compact that it comes within clearances of most U. S. standard-gage railroads and can be shipped without major dismantling. Clearances are reduced, and the center of gravity lowered, by combining roller path and swing rack in the truck-frame casting; center pintle and the heavy reinforcements necessary to support it are eliminated by the use of single-plane conical hook rollers; A-frame is arranged so that it can be lowered easily without dismantling the cab; and all excess weight is eliminated by the use of special modern high-strength light-weight alloy steels.

•

CRANE; ROOTER

R. G. LeTourneau Inc., Peoria, Ill., announces two new machines, a tractor crane and "Rooter." A tractor supplies power for lifting and hauling, and at the same time controls the entire operation of the crane. An automatic power-control brake safely locks the load while being hauled. Three crane sizes, 20-, 30- and 40-ft., are available and the tractor will lift steady, constant loads up to 20,000 lb. There is a choice of steel wheels, single or double pneumatic tires.

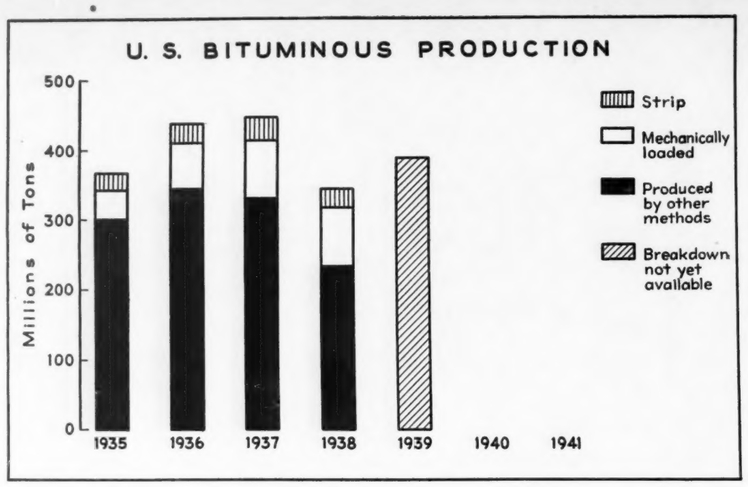
The "Rooter" is designed break ground, making it possi to use Carryall scrapers in toughest materials (hard limestone, shale, gravel and fr ground). It is powered by tractor and built in three siz S3 for 20 in. penetration; H3 29 in. penetration; and K3 extra heavy duty in 29 in. p tration. Its use is said to exp scraper savings over 30 per c wider range and give more p load profit in 40 per cent fas loading time with a savings equipment.

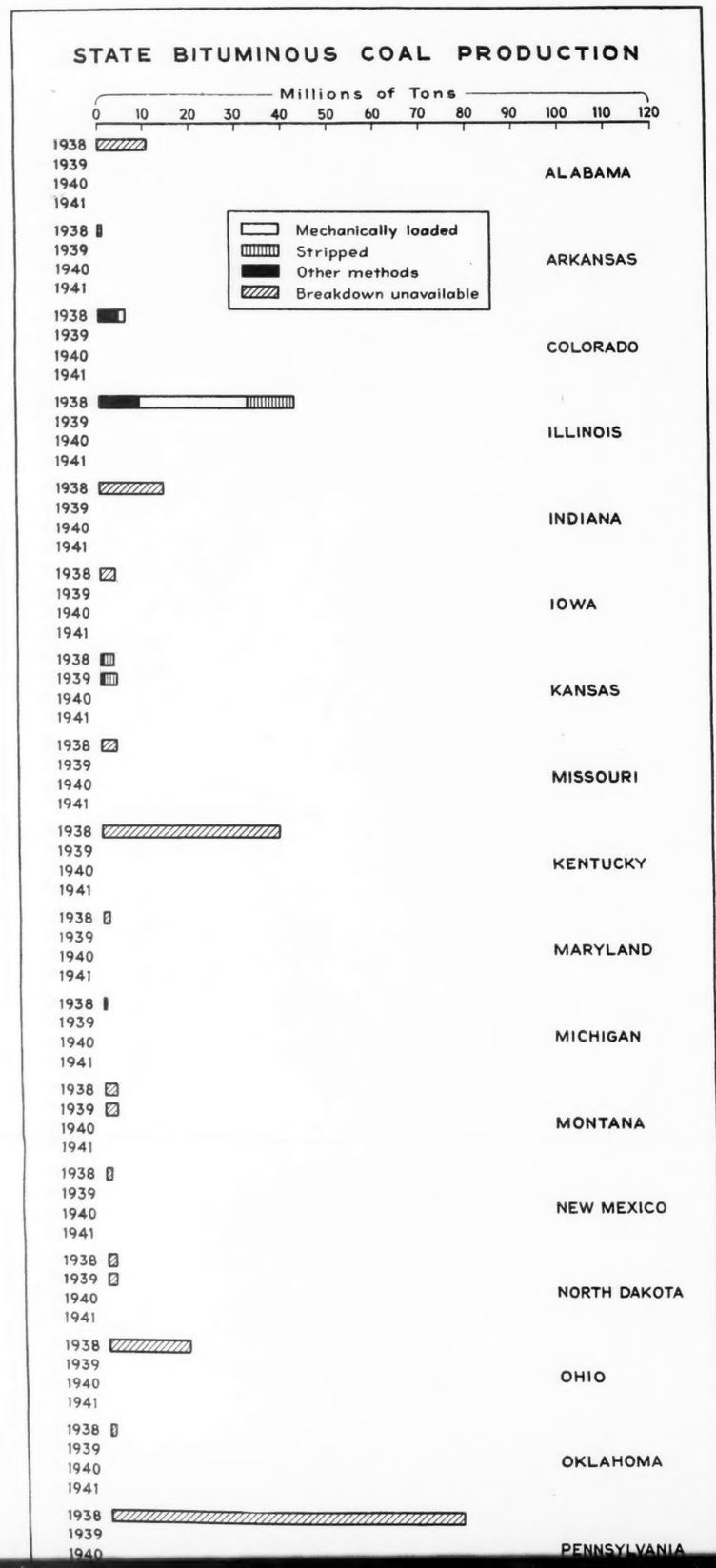
•

CEMENT-LINED STEEL PIP

An improved process in the manufacture of pipe for transmission of highly corrosive fluids has been perfected by t Jones & Laughlin Steel Corpo tion, Pittsburgh, Pa. It is stat that a measured quantity of mix is placed in the pipe and forc against the walls by a proc which at the same time extract high percentage of the wat leaving a lining with the high physical properties. This resu

in extremely even distribution the mixture, producing a lini having a lower friction coefficie than the original pipe. The pi can be shipped, cut and fitt just as unlined pipe and no sp cial handling is required exc that the pipe cannot be de or deformed. It has the s working pressures as regular st pipe.





130 CUES TO C

NEW CONSTRUCTION

1. Would contracting of engineering of new operations and part or all of the construction pay?

2. If done by the company, is sufficient surveying and drafting equipment available and is it in good condition?

3. Has the acreage been prospected?

4. If drilling is necessary for data on the coal, nature of overburden, suitability of ground for foundations, etc., has study been made of:

(a) The possibilities of contracting?
(b) Purchase of new equipment or replacement of old with more efficient units useful in the future for power and water holes, etc?

5. Can coal samples be analyzed or have other arrangements been made?

6. Labor is expensive. Have requirements been estimated and the work planned to avoid waste of time?

7. Can present supervisors handle construction or are new men needed?

8. Have provisions been made for power connections and have self-contained power units, possibly useful in future building or emergency, been studied?

9. Have provisions been made for receiving and storing material and equipment, including a crane, derrick, etc., also able to assist in construction?

10. If excavation is done by the company, has future usefulness of such equipment as draglines, bulldozers, scrapers, etc., in road- and dam-building, ditching, clearing, etc., been considered in specifying excavating units purchased?

11. Is the company prepared to sink new shafts or slopes?

12. Have the relative long-time costs of slope conveyors and hoists been investigated?

13. If slopes are chosen, has sinking with loading machines and conveyors to handle spoil been considered?

14. Would spoil-storage bins insure more continuous sinking and facilitate loading trucks or other disposal units?

15. Would conveyors on the surface be a cheaper spoil-disposal medium?

16. Have the proper explosives been selected and facilities provided for handling, storage and transportation?

17. Have provisions been made for handling water and supplying construction?

18. Can construction materials be obtained locally as needed or must they be shipped in and stored?

19. Can rock at hand be used in construction and is purchase of equipment to prepare it advisable?

20. Have mixers, compressors, fuel storage and accessories been provided?

21. Have provisions been made for a forge, tool and repair shops, etc?

22. Have provisions, such as wash- and change-houses, been made for the comfort and convenience of workers?

23. Have provisions been made for safety and first-aid?

MINING METHODS

24. Is the mining plan regularly checked to ascertain, for example:

(a) If number of places per section fits the operating cycle and capacities of the equipment units used?
(b) If changing equipment or conditions necessitate or permit changing place widths for greater efficiency?
(c) If changing to angle working would ease haulage, equipment moves, etc.?
(d) If revising projections would shorten hauls, reduce grades, etc.?

25. Have the possibilities of full-retreat mining been fully explored?

26. Have active workings been concentrated in the smallest possible area?

27. Have provisions been made for shortening air travel, reducing pumping, facilitating sealing of old works, erection of explosion barriers, etc.?

(c) Shearing to increase lump, reduce explosive requirements, etc.?

34. Has such special equipment as low-horsepower shortwalls for conveyor work, etc., been investigated?

35. Have patent bits, heat-treating and tipping been studied to see if they will reduce sharpening, transporting and setting labor, power consumption and machine maintenance?

36. Has drilling been surveyed from the standpoints of:

(a) The merits of hand-held, post-mounted and track-mounted drills?
(b) Cutting heads and bits, conveyor or twisted augers, etc.?

37. Are drills fitted with safety collars, sleeves, switches, clutches, etc.?

38. Are drillers supplied with suitable tool carts, including grinders?

BREAKING DOWN COAL

39. Are face-preparation men furnished with necessary tools, such as bugdust shovels, scrapers, tamping bars, etc.?

40. Is proper stemming available and have patent tamping plugs been studied?

41. Have machines for filling tamping bags been investigated?

42. Has investigation to determine proper explosives and drilling patterns included suggestions from face-preparation men, loaders and bosses, as well as actual broad-scale tests?

43. Have carbon-dioxide, air and hydraulic coal breaking been surveyed from the viewpoint of shooting on shift, pulling deep cuts, raising lump and loadability and other advantages?

44. Has hole burden been equalized and does each hole relieve the next through shooting in order, sequence delays, etc.?

45. Are good shooting cables, with reels, efficient shotfiring units and similar shooting aids provided?

46. Are safe and efficient provisions made for transporting explosives, storing them underground when permitted, etc.?

47. Do shotfirers have good carriers for explosives and detonators?

LOADING

48. Since mechanization reduces labor costs per ton 25 to 75 per cent, has investigation been made of the cost-reduction possibilities of:

(a) Reducing lift by using pit-car loaders, hand-loaded conveyors and scraper haulers, and similar equipment?
(b) Mechanizing the lift with mobile loaders, self-loading conveyors and scrapers, and similar equipment?

49. Have new developments in equipment been studied from the standpoints of:

(a) Replacing other mechanization units with mobile machines?
(b) Replacing old machines with new to raise output and cut maintenance?
(c) Using mobile loaders in connection with face and room conveyors?
(d) Installing self-loading conveyors?

50. Has special equipment, such as hand- or self-loading conveyors, scrapers and mucking machines, been considered for entry-driving, especially in thin coal where rock must be taken for height?

51. Are sufficient spare mechanization units available for replacements in case of breakdowns, overhauls, etc.?

52. Has study been given to working more than one shift to increase tonnage without raising investment?

ROOF SUPPORT

53. Has roof been thoroughly investigated and the material tested to determine the maximum width of opening possible with the least use of timber?

54. Has timbering been studied to determine possible savings by:

(a) Treatment to prolong life?

62. Have high-strength alloys for cages and skips been studied from the weight-reduction and corrosion standpoints?

63. Have shaft and slope ropes been surveyed to see if a different type will result in lower costs?

64. With other measures taken, have new, larger high-speed locomotives or tandem units been considered to maintain haulage performance?

65. Will relay locomotives or different relay practices relieve main lines?

66. Considering that some successful conveyor systems are several miles long, has this haulage method been studied?

67. In building main and secondary roads, has consideration been given to:

(a) Grade reduction to increase trip size and reduce power peaks?
(b) Adequate drainage, proper subgrade and ballast, proper clearances?
(c) Heavier rail, welded joints, steel ties or welded cross members at intervals to maintain gage, etc.?
(d) Treatment to prolong tie life and cut replacement cost and labor?
(e) Long-radius curves, super-elevation; alloy frogs, crossings, etc.; welding and hard-surfacing of parts, etc.?
(f) Adequate roof support, such as treated timber, concrete, masonry, steel, guniting, hitch-drill bars, etc.?

68. Has dispatching been studied for proper haulage control?

69. Have block signals, switch-position signals, electric switchthrowers and similar haulage aids been investigated?

70. Has gathering - locomotive equipment been studied for such items as:

(a) Locomotive weight or ability to handle larger cars or trips?
(b) Reducing (or increasing) speed for better performance?

71. Have the possibilities of battery locomotives, particularly in gathering and car-changing, been investigated?

72. Has track in working sections been studied from the standpoints of:

(a) Weight of rail, particularly with heavier requirements?
(b) Use of steel ties for quicker laying and saving in height?
(c) Raising switchlaying speed by steel-tie switches, sectional switches, etc.?
(d) Use of mine-car transfers and similar devices to speed car-changing.
(e) Use of stub tracks, double room tracks, room sidings, connecting tracks through crosscuts and similar means of reducing car-changing time?

73. Are tracklayers supplied with tool carts and such tools as light-weight benders and punches, bars, jacks, etc.?

74. Are locomotives supplied with jacks, rerailers and the like?

75. Mine cars materially influence cost and performance figures; has consideration, therefore, been given to:

(a) The increased capacity without material changes in dimensions provided by new designs?
(b) The possibilities of raising loading-machine output by using a larger car to cut number of changes?
(c) The savings in maintenance and power and the smoother operation and safety provided by improved construction and accessories, such as welding, high-strength and corrosion-resisting alloys, anti-friction bearings, special axle and wheel metals, high-strength hitchings, automatic couplers, spring draft and buffing gears, hydraulic brakes, etc.?

76. Where cages, etc., limit car size, have large cars, particularly the drop-bottom type, and underground transfer hoppers been considered for use behind loading machines?

77. Has a survey been made to see if the theoretical advantages of conveyor transportation can be realized in:

(a) Room transportation.
(b) Room- or panel-entry transportation, where taking top or bottom frequently may be avoided?

78. Has use of car- and trip-spotting hoists at conveyor-loading points and elsewhere been investigated?

With ways and means per man-shift taking the thoughts of the coal ind Coal Age offer, in the tw plement, certain data an it is hoped will help in Comparison of results n lent method of judging certain vital statistics o

Bituminous 0
1937
1938
1939
1940
1941
Anthracite
1937
1938
1939
1940
1941

TONS

		1937
ALA.	Deep	2.74
	Strip	2.75
	My mine	
ARK.	Deep	2.58
	Strip	6.88
	My mine	
COLO.	State	4.21
	My mine	
ILL.	Deep	6.18
	Strip	17.40
	My mine	
IND.	Deep	6.86
	Strip	14.46
	My mine	
IOWA	Deep	2.64
	Strip	7.33
	My mine	
KAN.	Deep	2.04
	Strip	11.90
	My mine	
KY.	State	4.41
	My mine	
MD.	State	3.25
	My mine	
MICH.	State	2.88
	My mine	
MO.	Deep	1.91
	Strip	11.73
	My mine	
MONT.	Deep	6.52
	Strip	76.70
	My mine	

86. Has conditioning deterioration been inve

PUMPING AND

...S TO COAL-MINING PROFITS

...high-strength alloys for cages ...een studied from the weight- ...d corrosion standpoints?
... shaft and slope ropes been ... see if a different type will ...er costs?
... other measures taken, have ... high-speed locomotives or ... been considered to maintain ...formance?
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...uate drainage, proper subgrade ... proper clearances?
...ier rail, welded joints, steel ties ... cross members at intervals to ...age, etc.?
...tment to prolong tie life and ...ment cost and labor?
...-radius curves, super-elevation; ..., crossings, etc.; welding and ...ing of parts, etc.?
...quate roof support, such as ...ber, concrete, masonry, steel, ...itch-drill bars, etc.?
...ispatching been studied for ...ge control?
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...notive weight or ability to han- ...ars or trips?
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... of stub tracks, double room ...m sidings, connecting tracks ...sscuts and similar means of re- ...changing time?
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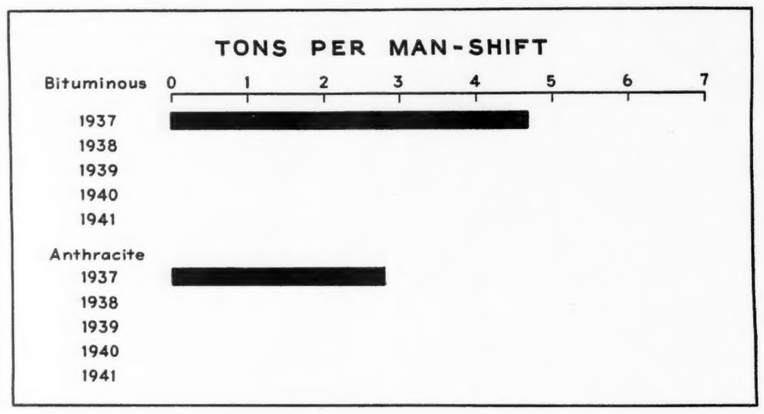
... cages, etc., limit car size, ...ars, particularly the drop- ... and underground transfer ... considered for use behind ...ines?
... survey been made to see if ...al advantages of conveyor ...n can be realized in:
...n transportation.
...n- or panel-entry transportation, ...ng top or bottom frequently may ...?

With ways and means of increasing output per man-shift taking the leading place in the thoughts of the coal industry, the editors of Coal Age offer, in the two parts of this supplement, certain data and suggestions which it is hoped will help in achieving this goal. Comparison of results naturally is an excellent method of judging progress. Therefore, certain vital statistics on the industry are offered in the charts, which are prepared so that new data may be added and the mine figures inserted for comparative purposes. Certain questions which might be asked in considering equipment purchases or improvements in production, preparation and auxiliary activities are set forth in the second part of this supplement. Others naturally will occur to men in the industry.



TONS PER MAN-SHIFT BY STATES

		1937	1938	1939	1940
ALA.	Deep	2.74	2.56		
	Strip	2.75	2.96		
	My mine				
ARK.	Deep	2.58			
	Strip	6.88			
	My mine				
COLO.	State	4.21	4.14		
	My mine				
ILL.	Deep	6.18	6.90		
	Strip	17.40	15.00		
	My mine				
IND.	Deep	6.86			
	Strip	14.46			
	My mine				
IOWA	Deep	2.64			
	Strip	7.33			
	My mine				
KAN.	Deep	2.04	3.90		
	Strip	11.90	17.08		
	My mine				
KY.	State	4.41			
	My mine				
MD.	State	3.25			
	My mine				
MICH.	State	2.88			
	My mine				
MO.	Deep	1.91	1.72		
	Strip	11.73	13.73		
	My mine				
MONT.	Deep	6.52			
	Strip	76.70			
	My mine				

		1937	1938	1939	1940
N.M.	State	3.17			
	My mine				
N. D.	Deep	5.50			
	Strip	13.13			
	My mine				
OHIO	Deep	4.23			
	Strip	10.57			
	My mine				
OKLA.	Deep	2.77			
	Strip	12.51			
	My mine				
PA.	Deep	4.13			
	Strip	8.15			
	My mine				
TENN.	State	3.17			
	My mine				
TEXAS	State	5.59			
	My mine				
UTAH	State	5.88			
	My mine				
VA.	State	4.18			
	My mine				
WASH.	State	3.40	3.62		
	My mine				
W. VA.	State	5.00	5.19	5.49	
	My mine				
WYO.	Deep	6.04	6.90		
	Strip	9.55	10.00		
	My mine				
PA. Anth.	Deep	2.58			
	Strip	6.76			
	My mine				

86. Has conditioning air to reduce roof ... power purchases or shutting ...

(f) Use of storage batteries floating on the line to help out with peaks?
(g) Provisions for idle-day operation without running too many substations?
(h) Proper trolley wire, adequate feeder capacity and good line material?
(i) Proper size and type of bonds, rail welding, auxiliary returns, etc.?
(j) Use of separate positive and return lines to serve face equipment?
(k) Load distributors or other means of spreading demand and preventing service interruptions?
(l) Type, length and size of trailing cables?
(m) Vulcanizing trailing cables?
(n) Use of modern junction boxes for connecting trailing cables?
(o) Fusing of cables, grounding of machinery and equipment, etc.?
(p) Sectionalizing the d.c. system by manual or automatic equipment?
(q) Use of modern starting equipment providing control of starting and running with necessary protection?

96. Is care used to apply the proper type and size of motor?

97. Have such motor characteristics as improved insulation, anti-friction bearings, fan-cooling, splash-, dust- and explosion-proof construction, improved lubrication, etc., been investigated?

MAINTENANCE

98. In setting up maintenance, has consideration been given to:
(a) Regular inspections of equipment and such auxiliaries as electrical circuits and controls, wire rope, etc.?
(b) Regular equipment overhauls—electric on an insulation-resistance basis; machinery, ropes, etc., on a tonnage or time basis; and the like?
(c) Study of quantity and nature of repair work to see if heavy or complicated jobs should be sent out or equipment bought to handle them?
(d) Whether auxiliary repair shops near the workings are advisable?
(e) Whether small stocks of parts should be kept on working sections?
(f) Adequate pit and crane facilities, ample tools and tool cars, etc.?
(g) Special lubricating trucks; adequate, efficient lubricators, etc.?

99. Are the advantages being realized of such new developments as:
(a) Electric welding and gas welding and cutting in such work as cutting, flame hardening, general welding, hard-surfacing, tire-filling etc.?
(b) Cutting and welding at the face or in the field?
(c) Piping of acetylene and oxygen from central points for more efficiency?
(d) Welding or metallizing to build up or reclaim machine and equipment parts, shafts and axles, flights, etc.?
(e) Use of high-strength corrosion- or wear-resisting metals for greater strength and longer life.
(f) Improved anti-friction bearings, including lubricated-for-life types?
(g) New insulating materials, such as asbestos and fiber-glass?

SUPPLIES

100. Have equipment and parts inventories been studied to determine:
(a) If equipment standardization will cut investment in inventory?
(b) If close sources and good transportation will permit carrying a smaller volume of parts and supplies?

101. Do records covering receipt and issuance of supplies readily show:
(a) Cost and quantity each item received, issued and on hand at all times?
(b) Issuance by machines or machine groups or mining or surface accounts?
(c) If abnormal quantities are going to specific machines or operations?
(b) Systematic timbering and the use of safety posts and bars?
(c) Car stops, derails, jacks and rerailing equipment, signal systems, clearances, improved hitchings, automatic couplers, trip lights, etc.?
(d) Machinery guards, guard rails and safety treads on stairways, etc.?
(e) Better ventilation and increased use of permissible electrical equipment, miners' lights, explosives and blasting devices, etc.?
(f) Sprinkling to allay dust?
(g) Rock-dusting, including improved barriers and new-type regular and special (conveyor, etc.) dusting machines?
(h) Protective clothing—hats, shoes, goggles, gloves, safety belts, etc.?
(i) Proper fire-extinguishing equipment for all types of fires?
(j) Proper electrical safeguards—fuses, grounding equipment, safety-type switches, trolley and conductor guards, rubber mats, etc.?
(k) Safety lamps and methane and noxious-gas indicators and alarms?

108. Is rescue equipment (masks, oxygen apparatus, life lines, etc.) provided?

109. Is first-aid material suitable, sufficient and handy to working sections?

PREPARATION

110. Have markets and present preparation practices been studied to determine:
(a) If screening equipment provides the required accuracy and flexibility?
(b) If facilities for removing degradation are adequate?
(c) If screening and crushing equipment would assist in meeting the growing demand for small sizes and stoker coal?
(d) If dedusting screens are necessary for better screenings and stoker?
(e) If mixing equipment should be installed or revised for greater flexibility in shipping combinations?
(f) If special blending equipment, including storage bins, proportioning gates or feeders, etc., should be installed for "prescription" sizes?
(g) If special crushing or other facilities are required for meeting seasonal excesses in certain sizes?
(h) If present picking facilities can turn out a satisfactory product?
(i) If mechanical cleaning of certain sizes or a range of sizes would result in a cleaner and more uniform fuel to retain or extend markets?
(j) If mechanical cleaning can be extended to larger sizes to reduce cleaning cost and promote uniformity?
(k) If mechanical cleaning is adopted, whether washing, dry-cleaning or a combination is most suitable?
(l) If raw-coal storage and blending will raise cleaning efficiency and insure continuous plant operation?
(m) If an adequately staffed laboratory will assist in satisfying customers by better product control?
(n) If trademarking by color or labeling is advisable?

111. Has consideration been given to increasing recovery by:
(a) Crushing and re-treatment of pickings and cleaner middlings?
(b) Reclamation and/or beneficiation of slurry by settling equipment, classifiers, continuous centrifugal equipment, flotation cells, tables, etc.?
(c) Installation of special cleaners to recover coal from mine slate?
(d) Installation of proper scale and conveyor-weighing equipment?

112. In washing, has consideration been given to freeze prevention and/or increasing B.t.u. content by:
(a) Special dewatering screens with or without high-velocity cold air for additional drying?
(b) Calcium chloride and other materials to prevent freezing?
(c) Continuous centrifuges, filters and other mechanical dryers?
(d) Heat-drying equipment, bin or ...

(a) Installation or improvement of a comprehensive telephone system?
(b) Possible "radio" communication?
(c) Loud-speaker or public-address systems for shops, offices, halls, man-trip stations, conveyor faces, etc.?
(d) Teletype between offices?

ILLUMINATION

118. Has illumination been studied to determine the possibilities of:
(a) Savings by better miner's lamps, particularly the electric type?
(b) Floodlighting of face operations?
(c) Installation or improvement of lighting for headings, shaft and slope bottoms and similar openings?
(d) Improved local and general lighting of shops, supply houses, preparation plants, first-aid rooms, meeting halls, offices, etc.?
(e) Improved picking lights?
(f) Proper floodlighting of yards, grounds and plant for night operation?
(g) Adequate supplies of extension cords, battery lights and the like?

STRIPPING

119. In specifying new strippers, have the possibilities been studied of:
(a) Two smaller shovels instead of a large one for greater flexibility and decreased likelihood of complete stoppage in case of trouble?
(b) A shovel-and-dragline combination for tandem operation?
(c) A smaller shovel with a stacker for handling the spoil?
(d) Large draglines for stripping heavier-than-normal overburden?
(e) "Knee-action" and other late shovel developments?

120. Is it possible to increase capacity of present equipment by:
(a) Counterbalancing the hoist, use of larger light-weight dippers or buckets, etc.?
(b) Increasing swing or hoist speed?
(c) Installation of draglines to handle part of the overburden?

121. Has a study been made of the possibilities of equipment such as small draglines, tractor-powered scrapers, etc., in assisting in box cuts, ditching, dam- and road-building and miscellaneous dirt-moving?

122. Are the full advantages of bulldozers and similar equipment being realized in assisting the strippers in cleaning up, grading, cleaning coal, etc.?

123. For overburden drilling, has a study been made of the relative merits of:
(a) Modern well-type drills?
(b) Vertical auger and rotary drills or combinations with well drills?
(c) Sidewall drills, including types for angle drilling?

124. Has blasting been studied from the viewpoints of such questions as:
(a) The relative merits of blasting powders, high explosives and liquid oxygen; splitting charges in holes, etc.?
(b) Revisions in drilling patterns including, with sidewall drills, long and short holes, double-decking, etc.?

125. Have coal-loading practices been surveyed from such standpoints as:
(a) Use of special dippers or special loaders—thrust, "knee-action," etc.?
(b) Possible adoption of the underground-type loading machine?
(c) The relative merits of hand work, bulldozers, power-operated sweepers, etc., in coal cleaning?
(d) The relative merits of air drills and vertical augers for shotholes?
(e) Use of channeling machines?

126. Has the general transportation picture been surveyed to determine if:

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(f) Use of storage batteries floating on the line to help out with peaks?

(g) Provisions for idle-day operation without running too many substations?

(h) Proper trolley wire, adequate feeder capacity and good line material?

(i) Proper size and type of bonds, rail welding, auxiliary returns, etc.?

(j) Use of separate positive and return lines to serve face equipment?

(k) Load distributors or other means of spreading demand and preventing service interruptions?

(l) Type, length and size of trailing cables?

(m) Vulcanizing trailing cables?

(n) Use of modern junction boxes for connecting trailing cables?

(o) Fusing of cables, grounding of machinery and equipment, etc.?

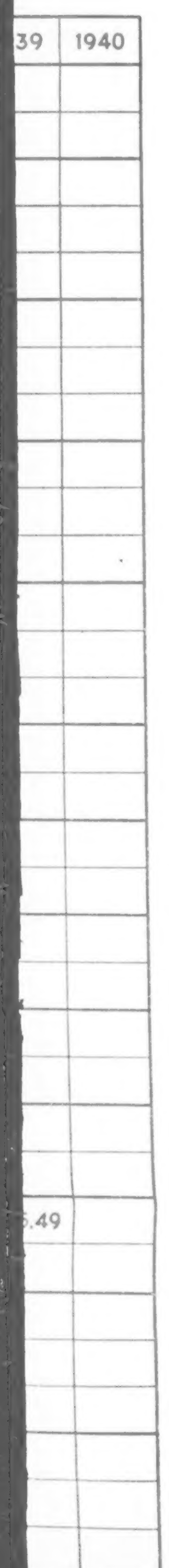
(p) Sectionalizing the d.c. system by manual or automatic equipment?

(q) Use of modern starting equipment providing control of starting and running with necessary protection?

96. Is care used to apply the proper type and size of motor?

97. Have such motor characteristics as improved insulation, anti-friction bearings, fan-cooling, splash-, dust- and explosion-proof construction, improved lubrication, etc., been investigated?

MAINTENANCE



98. In setting up maintenance, has consideration been given to:

(a) Regular inspections of equipment and such auxiliaries as electrical circuits and controls, wire rope, etc.?

(b) Regular equipment overhauls—electric on an insulation-resistance basis; machinery, ropes, etc., on a tonnage or time basis; and the like?

(c) Study of quantity and nature of repair work to see if heavy or complicated jobs should be sent out or equipment bought to handle them?

(d) Whether auxiliary repair shops near the workings are advisable?

(e) Whether small stocks of parts should be kept on working sections?

(f) Adequate pit and crane facilities, ample tools and tool cars, etc.?

(g) Special lubricating trucks; adequate, efficient lubricators, etc.?

99. Are the advantages being realized of such new developments as:

(a) Electric welding and gas welding and cutting in such work as cutting, flame hardening, general welding, hard-surfacing, tire-filling etc.?

(b) Cutting and welding at the face or in the field?

(c) Piping of acetylene and oxygen from central points for more efficiency?

(d) Welding or metallizing to build up or reclaim machine and equipment parts, shafts and axles, flights, etc.?

(e) Use of high-strength corrosion- or wear-resisting metals for greater strength and longer life.

(f) Improved anti-friction bearings, including lubricated-for-life types?

(g) New insulating materials, such as asbestos and fiber-glass?

SUPPLIES

100. Have equipment and parts inventories been studied to determine:

(a) If equipment standardization will cut investment in inventory?

(b) If close sources and good transportation will permit carrying a smaller volume of parts and supplies?

101. Do records covering receipt and issuance of supplies readily show:

(a) Cost and quantity each item received, issued and on hand at all times?

(b) Issuance by machines or machine groups or mining or surface accounts?

(c) If abnormal quantities are going to specific machines or operations?

102. Are suitable cranes, derricks, un-

g down an old

(b) Systematic timbering and the use of safety posts and bars?

(c) Car stops, derails, jacks and rerailing equipment, signal systems, clearances, improved hitchings, automatic couplers, trip lights, etc.?

(d) Machinery guards, guard rails and safety treads on stairways, etc.?

(e) Better ventilation and increased use of permissible electrical equipment, miners' lights, explosives and blasting devices, etc.?

(f) Sprinkling to allay dust?

(g) Rock-dusting, including improved barriers and new-type regular and special (conveyor, etc.) dusting machines?

(h) Protective clothing—hats, shoes, goggles, gloves, safety belts, etc.?

(i) Proper fire-extinguishing equipment for all types of fires?

(j) Proper electrical safeguards—fuses, grounding equipment, safety-type switches, trolley and conductor guards, rubber mats, etc.?

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(d) Heat-drying equipment—kiln- or sintering-type dryers, vertical drying

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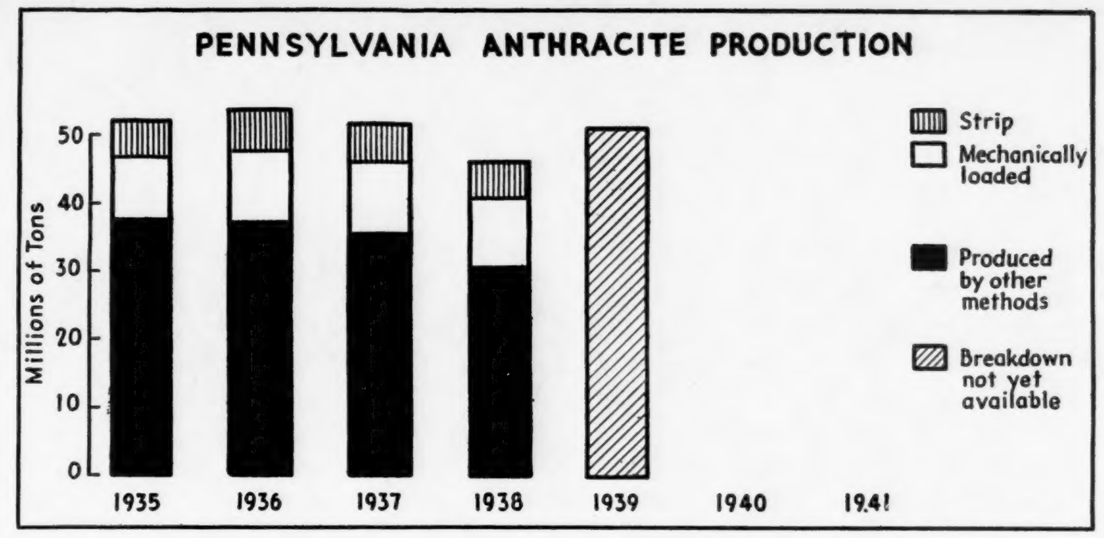

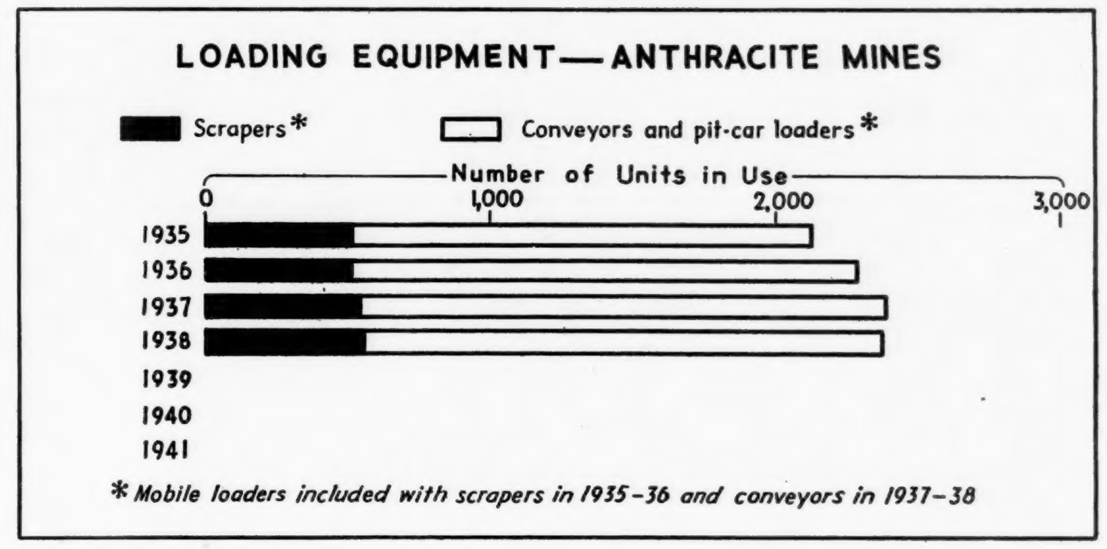

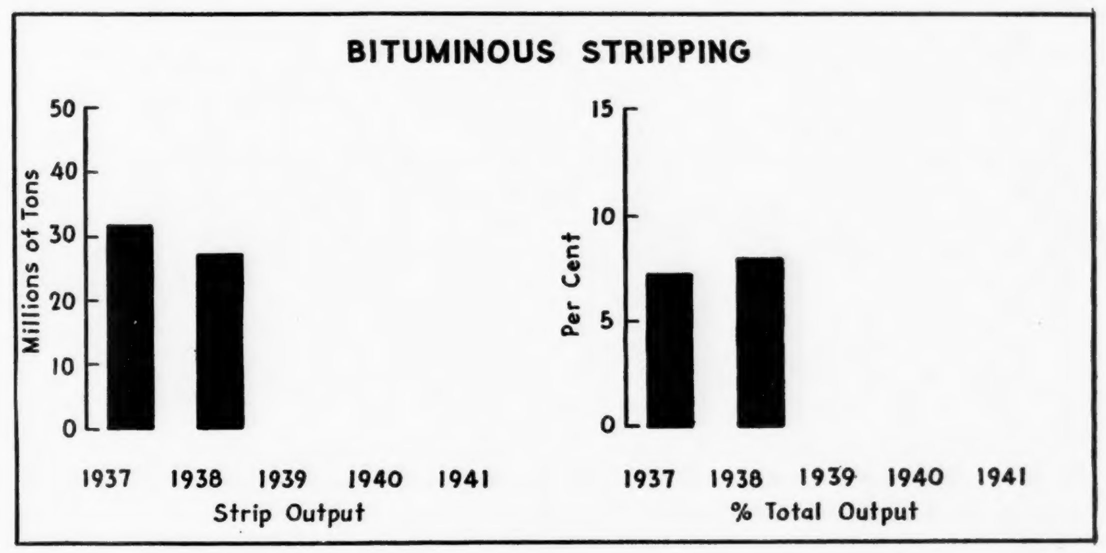

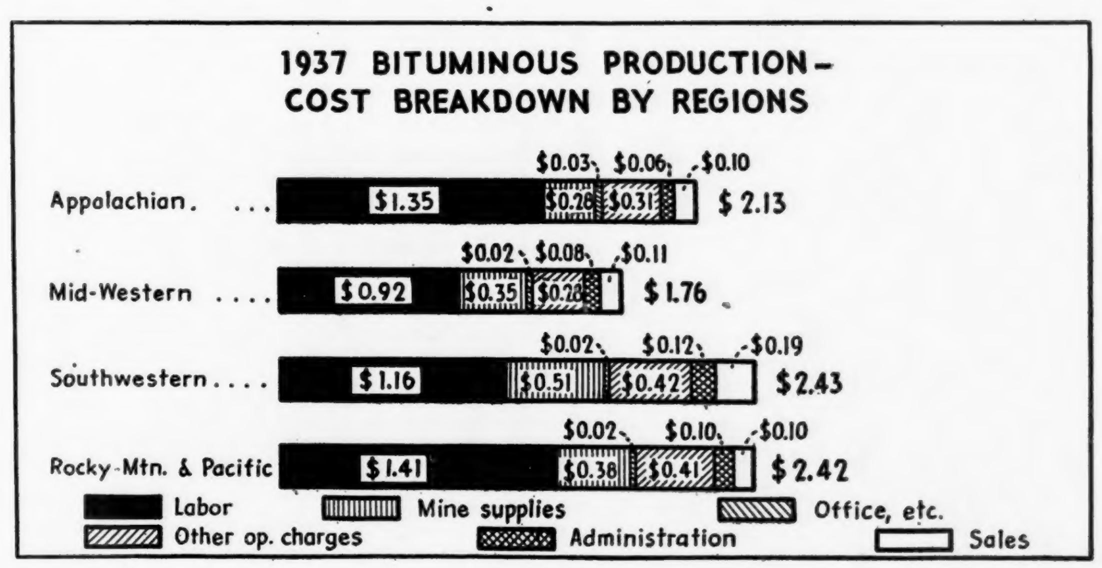

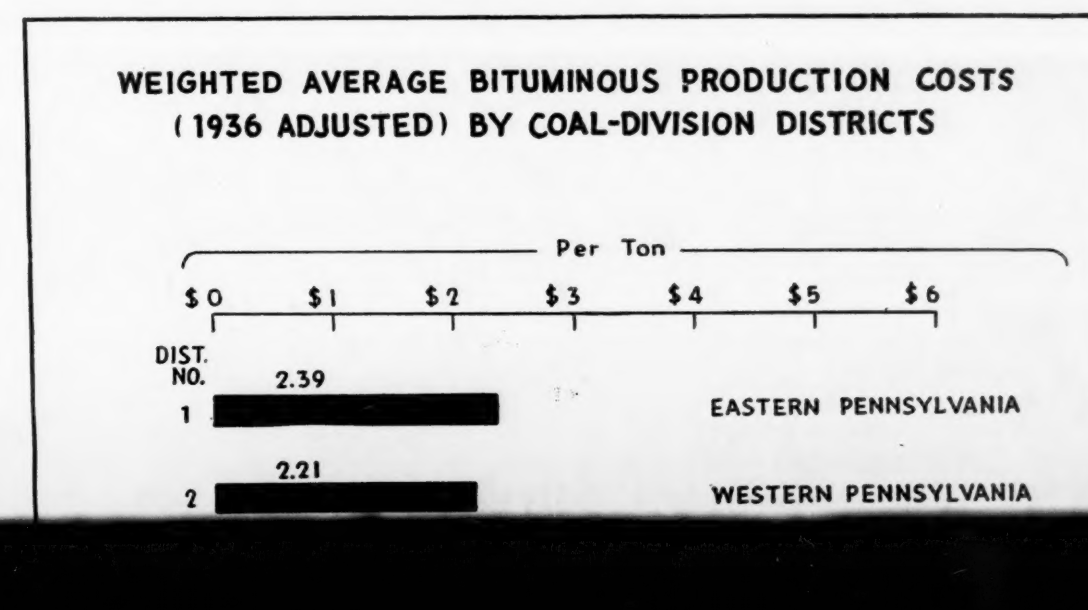

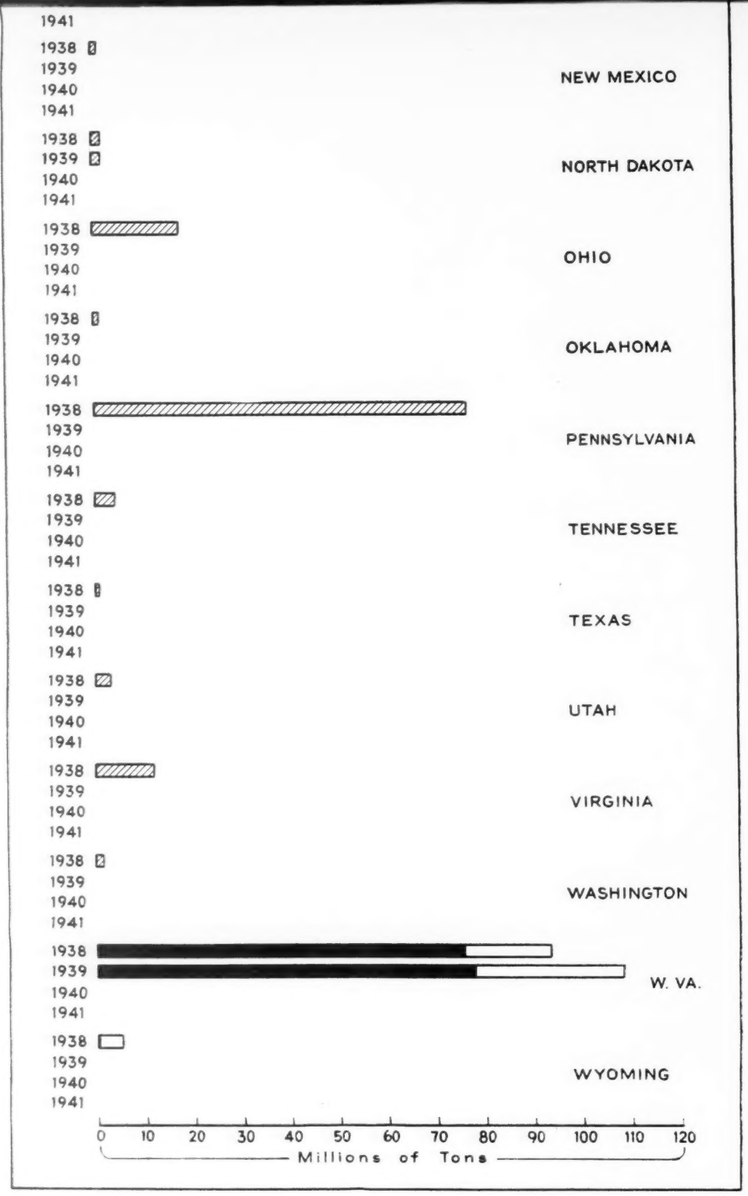

MINING METHODS

24. Is the mining plan regularly checked to ascertain, for example:

(a) If number of places per section fits the operating cycle and capacities of the equipment units used?

(b) If changing equipment or conditions necessitate or permit changing place widths for greater efficiency?

(c) If changing to angle working would ease haulage, equipment moves, etc.?

(d) If revising projections would shorten hauls, reduce grades, etc.?

25. Have the possibilities of full-retreat mining been fully explored?

26. Have active workings been concentrated in the smallest possible area?

27. Have provisions been made for shortening air travel, reducing pumping, facilitating sealing of old works, erection of explosion barriers, etc.?

28. Is provision made to keep up tonnage to the last in working sections and on final retreat over the mine?

29. Is development forecast for better control of expenditures and output?

30. Is a special coal reserve provided for quick development for sudden demand or difficulty in regular sections?

CUTTING AND DRILLING

31. If loading or conveying equipment is planned, is present cutting and drilling equipment adequate or should new units be purchased to effect greater cost savings?

32. If present cutting equipment lacks capacity, has study been given to such possible remedies as:

(a) Longer bars to raise tons per place?

(b) Increasing feed speed?

(c) Changing chains or bit positions, tipped or patent bits and other means of raising cutting speed and reducing bit setting time?

(d) Improved shortwall trucks to cut loading, unloading and moving time?

(e) Purchase of new shortwalls with the above and other advantages?

33. Have the possibilities of track-mounted cutters been studied from such standpoints as:

(a) Quicker moving and setting up, plus other modern characteristics?

(b) Cutting or cutting and gobbing impurity bands, rash, drawslate, etc.?

50. Has special equipment, such as hand- or self-loading conveyors, scrapers and mucking machines, been considered for entry-driving, especially in thin coal where rock must be taken for height?

51. Are sufficient spare mechanization units available for replacements in case of breakdowns, overhauls, etc.?

52. Has study been given to working more than one shift to increase tonnage without raising investment?

ROOF SUPPORT

53. Has roof been thoroughly investigated and the material tested to determine the maximum width of opening possible with the least use of timber?

54. Has timbering been studied to determine possible savings by:

(a) Treatment to prolong life?

(b) Use of masonry, concrete, granite, steel and concrete, etc., for long life?

(c) Use of the hitch drill to eliminate legs and speed installation?

55. Have the possibilities of steel roof and timber jacks, adjustable props, etc., for temporary support at the face been surveyed?

56. Are timbermen supplied with the proper tools, trucks and the like?

HAULAGE AND HOISTING

57. Have general transportation practices been surveyed to see if efficiency can be raised by such measures as:

(a) Relocating the opening or sinking a conveyor slope, driving a rock tunnel, etc., to replace slope or shallow- or medium-depth shaft hoists?

(b) Relocating inside hauls to shorten distances and reduce grades?

(c) Shortening total hauls by rock tunnels to pitching seams, new outside hauls, erection of bridges, etc.?

(d) Using aerial tramways across broken country and streams?

58. Have storage bins to reduce dumping delays and keep coal flowing to the preparation plant been considered?

59. Are car feeders, automatic cagers and trip-makers used to speed hoisting?

60. Have skips been considered to raise shaft capacity and permit the use of larger cars underground?

61. Have overturned cages been considered to permit use of larger solid cars?

safety provided by improved construction and accessories, such as welding, high-strength and corrosion-resisting alloys, anti-friction bearings, special axle and wheel metals, high-strength hitchings, automatic couplers, spring draft and buffing gears, hydraulic brakes, etc.?

76. Where cages, etc., limit car size, have large cars, particularly the drop-bottom type, and underground transfer hoppers been considered for use behind loading machines?

77. Has a survey been made to see if the theoretical advantages of conveyor transportation can be realized in:

(a) Room transportation.

(b) Room- or panel-entry transportation, where taking top or bottom frequently may be avoided?

78. Has use of car- and trip-spotting hoists at conveyor-loading points and elsewhere been investigated?

79. Has rubber-tired haulage as a means of increasing loader output by shortening car change and providing the advantages of large capacity been studied?

VENTILATION

80. Have ventilation practices been surveyed from the viewpoints of:

(a) Increasing airway area to cut velocity and resistance and raise flow?

(b) Sealing off old sections, driving new airways to cut travel, etc.?

(c) Sinking shafts or making new openings at the back end of the property to establish one-way air travel?

(d) Using more overcasts to eliminate doors?

(e) Employing air locks, automatic doors, etc., for greater efficiency?

(f) Better timbering of airways and regular cleaning to eliminate restrictions, reduce turbulence, etc.?

(g) Use of vanes, curves, etc., to prevent turbulence and loss of power where direction changes?

(h) Installation or increased use of brattice lines, auxiliary tubing blowers, etc., in carrying away gas, smoke and dust.

81. Will a new fan supply as much or more air with less power?

82. Will shaft-bottom fans, plus a surface standby, offer more efficiency?

83. Are standby fan drives provided?

84. Are fans equipped with alarms or other signals to show pressure drop?

85. Is the proper equipment for gas detection and air sampling available?

MICH.	State	2.88	
	My mine		
MO.	Deep	1.91	1.7
	Strip	11.73	13.7
	My mine		
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86. Has conditioning air deterioration been investig

PUMPING AND DR

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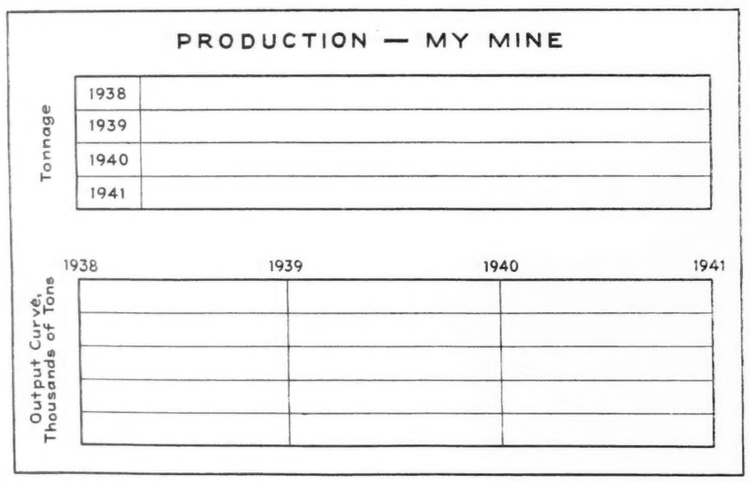

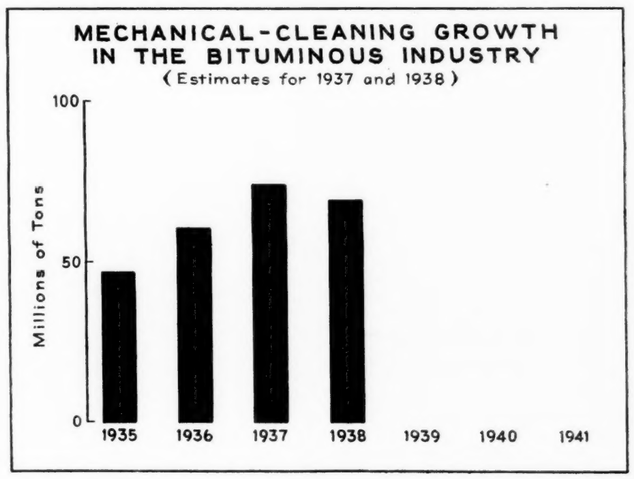

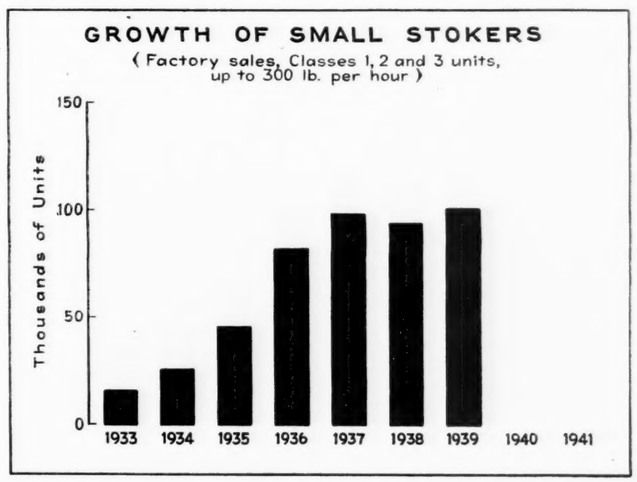

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WYO.	Deep	6.04	6.90		
	Strip	9.55	10.00		
	My mine				
PA. Anth.	Deep	2.58			
	Strip	6.76			
	My mine				

86. Has conditioning air to reduce roof deterioration been investigated?

PUMPING AND DRAINAGE

87. Has the dewatering situation been surveyed from the viewpoints of:

(a) Establishment of sumps at strategic locations to permit use of ditches, shorten pumping distances, etc.?

(b) Provisions for sealing, dams, emergency flood-control doors, etc.?

(c) Boreholes, new openings and other short routes to the surface?

(d) Use of rock-tunnels, inclined boreholes, ditches, siphons, etc.?

(e) Use of deep-well turbine pumps?

88. Have acid and abrasive questions been studied to determine:

(a) If special corrosion- or abrasion-resisting metal, wood, asbestos-cement, fiber or rubber pipe should be used?

(b) If special fittings are required?

(c) If special corrosion- or abrasion-resisting pump materials are required?

89. Have the possibilities of semi- or full-automatic pump controls, including automatic priming, been investigated?

90. Have gathering pumps been studied to see if they yield the maximum in portability, reliability and efficiency?

91. Are suitable and adequate quantities of accessories, such as foot and check valves, strainers, etc., available?

92. Has using mine water for sprinkling been investigated?

POWER

93. Have studies been made of:

(a) Building a plant and discontinuing power purchases or shutting down an old plant and buying energy?

(b) Replacing or rebuilding existing steam-raising and/or generating equipment to cut energy cost?

94. Has a.c. service been studied from the viewpoints of, for example:

(a) A higher incoming voltage?

(b) Consolidation of receiving points for central metering?

(c) The merits of limiting to avoid penalties from excessive peaks?

(d) Raising a.c. distribution voltage to 4,000 or 6,600 to reduce conductor size, cut losses and increase efficiency?

(e) Protection of lines and equipment against lightning?

(f) Use of a.c. instead of d.c. for operation of mine equipment?

(g) Non-inflammable transformer liquids.

(h) More synchronous motors, better fitting of motors to loads, capacitors, etc., to improve power-factor?

(i) Reduction of losses by higher voltages on larger motors?

(j) Ample-size conductors for both present and future loads, conduit and other circuit protection, etc.?

(k) Efficient grounding of equipment?

(l) Use of modern starting and control equipment, indicating and recording meters and other accessories?

95. In d.c. distribution and utilization, has consideration been given to:

(a) Regular checks, with instruments, of voltage, bond condition, etc.?

(b) Reduction of d.c. circuit lengths by substations underground near load centers, use of boreholes, etc.?

(c) Portable substations underground?

(d) Replacement of present conversion units with more efficient equipment, such as mercury-arc rectifiers?

(e) Making substations fully automatic or automatic on the d.c. side?

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(b) Issuance by machines or machine groups or mining or surface accounts?

(c) If abnormal quantities are going to specific machines or operations?

102. Are suitable cranes, derricks, unloading platforms, etc., available for handling heavy machinery and materials?

103. Are the necessary racks, sheds, etc., provided to protect steel, timber, heavy parts, etc., and facilitate issuance?

104. Has consideration been given in design of supply houses, to:

(a) Convenient bin arrangement and access for handling materials?

(b) Good general and local lighting?

(c) Proper bin design, including rotating and locking types as needed?

(d) Sectionalizing to permit grouping related classes of materials?

105. Are special storage houses properly designed from the standpoints of efficiency and safety—safety in the case of powder magazines, for example, and both safety and efficiency in the case of oil houses and the like?

SAFETY

106. Does the safety program contemplate such steps as:

(a) Employment of a safety engineer?

(b) Regular checking for hazards?

(c) Enlistment of employee cooperation and organization of safety groups?

(d) Education of employees and training in mine-rescue and first-aid?

(e) Enlistment of supervisory cooperation?

(f) Offering of incentives to bosses and men for good records?

(g) Combination time-clock report of hours worked and safety record?

107. Have surveys been made of the possibilities of protective measures such as:

(a) Thoroughly educating men in how to detect roof, rib and face hazards?

tion cells, tables, etc.?

(c) Installation of special cleaners to recover coal from mine slate?

(d) Installation of proper scale and conveyor-weighing equipment?

112. In washing, has consideration been given to freeze prevention and/or increasing B.t.u. content by:

(a) Special dewatering screens with or without high-velocity cold air for additional drying?

(b) Calcium chloride and other materials to prevent freezing?

(c) Continuous centrifuges, filters and other mechanical dryers?

(d) Heat-drying equipment—kiln- or sintering-type dryers, vertical drying shells, screen-type heat dryers, etc.?

113. Has consideration been given to such modern preparation aids as:

(a) Dustless treatment by chemicals, emulsions, oils, waxes, etc.?

(b) Tramp-iron magnets and pulleys?

(c) Pick breakers; stoker sizers?

(d) Special metals and alloys to reduce screen blinding and lengthen life?

(e) Retractile picking tables, chain-mat rescreening conveyors, shaking distributing chutes, suspended screen drives, special screen suspensions, etc.?

(f) Mercury-vapor, fluorescent, "day-blue" and other special picking lights?

(g) Improved loading equipment—box-car loaders, belt and rescreening booms, chutes and storage conveyors for car-changing, etc.?

(h) Dustproof plant construction?

REFUSE DISPOSAL

114. Has consideration been given to special provisions for handling mine slate, including special openings or hoists, storage tracks, dumps, loading hoppers, etc.?

115. Has a study been made of various surface-disposal methods, such as:

(a) Motor trucks to permit, if desired, use of refuse in fills, roads, etc.?

(b) Modern larry equipment for lower costs over cars and locomotives, etc.?

(c) Aerial tramways, particularly in rough country or where large quantities must be taken some distance?

116. Has refuse been investigated for use as mine ballast or in other ways?

COMMUNICATION

117. Has a survey been made of the time- and money-saving possibilities of:

short holes, double-decking, etc.?

125. Have coal-loading practices been surveyed from such standpoints as:

(a) Use of special dippers or special loaders—thrust, "knee-action," etc.?

(b) Possible adoption of the underground-type loading machine?

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(e) Use of channeling machines?

126. Has the general transportation picture been surveyed to determine if:

(a) Automotive haulage should be adopted?

(b) If, in case rail haulage is retained, it should be main-line only, with automotive pit haulage?

(c) If rail haulage should be electrified?

127. In automotive transportation, has consideration been given to:

(a) The relative merits of straight trucks, with or without special bodies, and tractors and trailers?

(b) Replacement of small trucks or trailers with larger equipment?

(c) The feasibility of a combination of semi- and full-trailers?

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(e) The advantages of better roads, such as concrete loaded-truck routes?

128. Is full advantage taken of ditches, dams, dikes, etc., for keeping water out of the pit?

129. Has study of pit dewatering included such considerations as:

(a) Changes in cut direction, leaving openings in the spoil and similar steps to facilitate natural drainage?

(b) The relative merits of gas and electric portable pumps; hose vs. pipe for discharge lines, etc.?

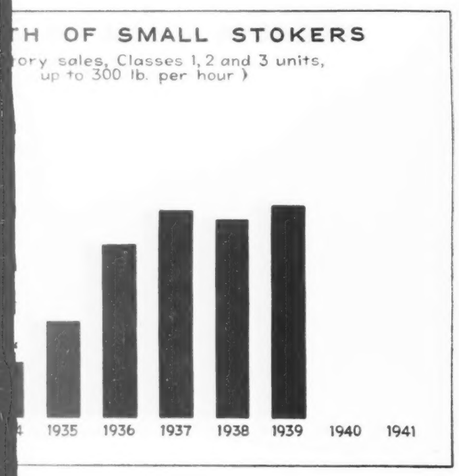
(c) Proper spotting of semi-permanent and permanent pumping stations?

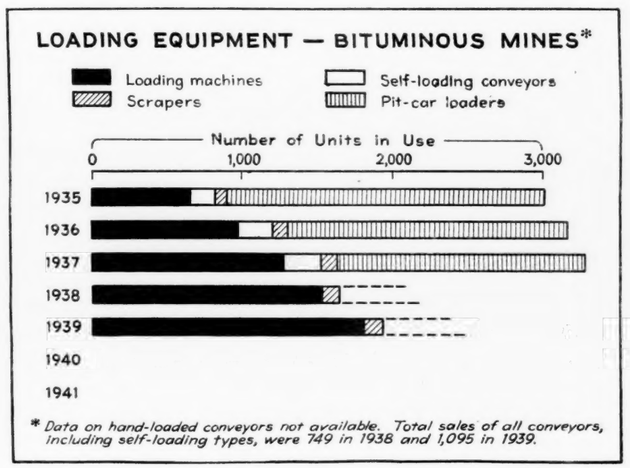
130. In the power field, has thought been given to such items as:

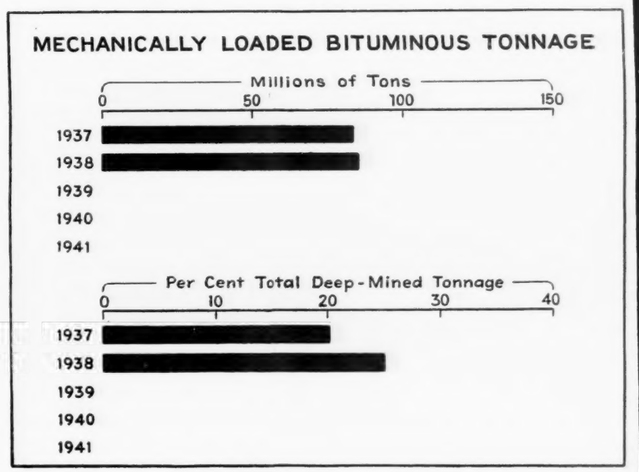
(a) Use of internal-combustion engines on equipment which is moved frequently, used in isolated sections, etc.?

(b) The relative merits of the ground-cable and pole-line-and-lateral systems of supplying pit power?

(c) Proper control and protective equipment, including switch houses or boxes, junction boxes, cable connectors, fuses, circuit breakers, oil switches, grounding of equipment, etc.?







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